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No. 11.

ANNUAL REPORT

OF THE

HARBOR AND LAND COMMISSIONERS

FOR THE YEAR 1890.

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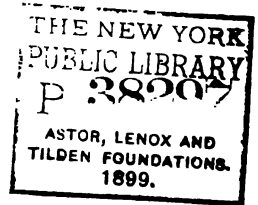


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Commonwealth of Massachusetts.

HARBOR AND LAND COMMISSIONERS' REPORT.

To the Honorable the Senate and the House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, in accordance with the provisions of law, respectfully submits its Annual Report for the year 1890.

SOUTH BOSTON FLATS.

The work of filling and improving the tide-water lands of the Commonwealth at South Boston has been continued without material change in the plan or methods of operation.

The 100-acre lot, all of which is inclosed and filled, and on a portion of which the streets have been graded with gravel, is in substantially the same condition as at the date of the last report. The sewers and other improvements are in good order. There have been sold from this lot the past year 21,421.5 square feet of land, lying between Congress and Fargo streets, for \$10,710.75. Several parcels on the northerly or water front, 28,500 square feet in all, have been leased on such terms as not to interfere with any permanent disposition of the territory which it may be desirable to make hereafter. The license which was given to the city of Boston two years ago for the temporary use of about 15 acres of this lot for a play ground, has been extended, on the same conditions, to cover the year ending December 31, 1891.

Progress of the Work.

The work of the last year has been mainly expended on the 75-acre lot, which adjoins the 100-acre lot on the east. This lot had been inclosed the previous year on its north-erly and easterly sides by a bulkhead. The sea-wall on the side toward the reserved channel, which was in process of building at the date of the last report, under a contract with Mr. Charles H. Edwards, was completed and the work accepted early in July last. This wall, 1,828 feet in finished length, now extends easterly to a point about 80 feet beyond the line of Congress Street as located across the reserved channel; and completes the inclosure of the 75-acre lot, with the exception of temporary gaps left in the easterly line of bulkhead for the passage of dump-scows. The sea-wall will serve also as an abutment for the bridge by which Congress Street will cross the reserved channel.

Upon the completion of the sea-wall in July, the Eastern Dredging Company deposited along its front about 6,000 cubic yards of clay dredged at East Boston, at a cost of 22 cents per yard. This was done to cover and strengthen the foundation of the wall, and to protect the timber in the foundation from the attacks of worms. In August, the New England Dredging Company was employed to dredge out a trench in the rear of the sea-wall, at a distance of about 40 feet so as not to disturb the stone ballast, and to place the material taken from the trench against the back of the wall. This method of filling immediately behind the wall was adopted as likely to cause the least out-ward pressure against the wall. The trench was after-wards re-filled by dumping from scows other material dredged from the reserved channel.

A contract, the terms of which were stated in the last report, was made with the New England Dredging Com-pany in April, 1889, to receive, elevate and deposit on the 75-acre lot all suitable material which should be offered by parties engaged in dredging in other parts of the harbor. There have been deposited under this contract the last year about 75,000 cubic yards of such material, equivalent

to nearly five acres of filled land, and making, with the work of the previous year, about 18 acres filled under this contract to date. All of this material has been deposited on or near the line of Congress Street extended to the reserved channel. Less than the usual quantity has been offered and handled under this contract the last year, owing to the comparatively small amount of miscellaneous dredging which has been done in the harbor, either by the general government or by private parties, excepting that done by parties who were using the material for filling their own lands. The funds provided for government work by the river and harbor act of 1888 had been exhausted, and the act of 1890 was passed too late in the year for operations to begin the past season. A larger supply of such material is expected the present year.

In addition to the filling under the above contract, nearly 14,000 cart-loads of ashes and other refuse have been deposited on the 75-acre lot by the department of sanitary police of the city of Boston, and over 20,000 cubic yards of earth and waste material, from excavations for buildings and the like, by various other parties. The cost of the former material has been reduced the past year from $12\frac{1}{2}$ to 6 cents per load; and the latter is supplied without any cost except the wages of a man to superintend the dumping.

Reserved Channel.

In 1889, a channel 60 feet wide and 12 feet deep at mean low water was dredged from the head of the reserved channel to Lawley's yacht yard, and thence 65 feet wide and 8 feet deep to the main ship channel,—as more fully described in the last report. This channel was found to be too narrow for safe and convenient use. In September last, a contract* was made with the New England Dredging Company, the lowest bidder, to widen both sections of the channel 50 feet, so that they should have a width of 110 and 115 feet respectively, with the same depths as before. The material taken from the channel has been used for filling the 75-acre lot. The work of

* See Appendix, C.

widening will be finished the present month. The channel will then probably answer the needs of navigation for some years to come, or until the whole improvement is further advanced.

Congress Street.

In view of the importance of Congress Street, as being the most direct and convenient public avenue by which access is had to the Commonwealth's land, and, when finished, by far the shortest and best thoroughfare for business and travel between the centre of the city and South Boston, much of the work of the last year has been directed to its early completion.

Congress Street extends across the territory of the Commonwealth from B Street easterly to the reserved channel, a distance of more than half a mile, with a width of 75 feet. All the material required to complete the filling of the land under and adjacent to the street, to the line of the sea-wall on the reserved channel, is now in place; and that portion of the street which is not already graded, will be ready for the gravel the coming spring. It is expected that the graveling will be finished during the next working season.

The city of Boston is just now making a contract for the further extension of L Street towards the line of the reserved channel on the South Boston side. The city engineer is considering the plans for a bridge across the channel to connect this street with Congress Street; and the mayor has been empowered by the city council to apply to the legislature at its present session for authority to raise the funds for its construction. All these facts point to the conclusion that the opening of this important avenue across the property of the Commonwealth will not be long delayed. In the meantime, some effectual remedy must and doubtless will be found for the dangerous and unwarranted obstruction of Congress Street by the seven freight tracks of the New York and New England Railroad Company which now cross it at grade.

Provision for Continuing the Work.

The balance in the "Commonwealth's Flats Improvement Fund" on the first day of January, 1890, available for carrying on the work, was \$4,247.23; to which there has been added during the year \$3,104.54 income of the fund, \$10,850.79 rents of land and proceeds of land sold, and \$127,000 paid into the fund from the treasury of the Commonwealth under the provisions of chapter 93 of the Acts of 1889 and chapter 12 of the Acts of 1890; making a total of \$145,202.56 available for the work. Of this sum there has been expended during the year, \$44,507.70, leaving an available balance, January 1, 1891, of \$100,694.86. In order to provide for the work now in progress and in contemplation, it is estimated that it will be necessary to provide for the payment of \$20,000 into the fund the present year.

CHARLES RIVER.

The order of the Secretary of War for the alteration of the four lower highway bridges across Charles River, which was served on the cities of Boston and Cambridge in December, 1888, has not resulted in the making of any changes in these bridges, at least for the present.

At the date of the last report, application had been made in behalf of the cities to the present Secretary of War to revoke the order; and the bridges in question had been referred by his direction to a board of engineers for consideration. This board made an interesting and exhaustive report in February last.

As was to be expected from the character and ability of the board, the idea of a closure of the river to navigation, which has sometimes been unadvisedly advanced, finds no encouragement at its hands. After a careful review of the facts relating to the navigation of the river and the condition of the bridges, the report says:—

The Charles River, where it traverses the city, still remains an important tidal reservoir, and a valuable highway for commerce, which the general government should not only unceasingly protect against

wanton injury, but foster by increased facilities where such can be secured with a consistent regard to vested rights.

The conclusion of the report is as follows: —

The Board is of the opinion that, for the present, the draw-openings through the West Boston and Craigie's (Canal) bridges, although small, may be retained without material injury to commerce; but that the openings through the Charles River and Warren bridges, now 36 feet wide, ought to be enlarged, whenever the renewal of the bridges is taken in hand, to make the navigation through them "free, easy and unobstructed" for vessels exceeding about 700 tons. The Board was furnished by bridge-tenders with the names of several vessels which had applied to pass the bridges, but could not be accommodated because their beams exceeded the width of the draw; and it is fair to presume that the known deficient width of the draws prevented applications from being made by other vessels.

The draw-bridges, although of primitive type, are manoeuvred by steam power, with good appliances, and the time consumed in closing and opening the draws is not so great as to detain vessels unnecessarily for this reason alone.

The basin between the Charles River and Warren bridges is so limited in area that only seven to nine vessels can conveniently anchor there at one time. The only other possible anchorage, so long as the present bridge system is maintained, lies above the last railroad bridge. Therefore it may be said in general that there is no object in a vessel bound to the upper basin endeavoring to go above the Charles River bridge, unless facilities be given for its passing the entire bridge system. In practice, vessels lie at anchor below Charles River bridge, and pass through and above it in numbers corresponding with the opportunities afforded for going beyond the railroad bridges.

For these reasons, while the Board is of the opinion that the draws of the Charles River and Warren bridges are not adequately wide for the largest class of vessels which may navigate the river, and that in the case of all the city bridges the flow of the water is excessively and needlessly obstructed, it does not recommend, in the absence of specific instructions as to the modifications to be made in the railroad bridges, that the city be required to incur at this time expenses for alterations in the bridges controlled by them, which might not conform to the alterations hereafter to be demanded from the railroad authorities.

It is, however, recommended that when extensive repairs or rebuilding of these old city bridges become necessary, they shall be made to conform to modern practice, as has been done in the case of the new Harvard bridge just completed. Such a requirement would

be far less onerous than the plans outlined by the joint commission, composed of the Harbor Commissioners and Railroad Commissioners, to which the subject was referred for report by the legislature of Massachusetts in 1870.

These recommendations were approved by the Chief of Engineers, and thereupon Secretary Proctor made the following order :—

The time fixed in the orders of the Secretary of War of December 6, 1888, requiring the cities of Boston and Cambridge to alter their bridges by the first of January, 1891, is hereby indefinitely extended, subject to further action whenever the conditions suggested by the Board require it.

The board of engineers was embarrassed by the fact that the railroad bridges, which form one system with the city bridges, were excluded from its consideration by the terms of the instructions under which it was acting. The railroad bridges, as now maintained, are not only a more serious obstruction of the river than the city bridges, but the difficulties in the way of correcting their defects are more formidable. Although orders had been served on the railroad corporations at the same time and in the same terms as on the cities, the manner of altering the railroad bridges had not been prescribed or determined; and, until this harder problem was solved, the board could not deal intelligently with the city bridges. The proper order of consideration had obviously been inverted.

In the meantime, the railroad corporations have apparently ignored the orders of the war department. They have not asked for a revocation or modification of the orders, and have taken no steps to comply with them. The prescribed time for making the alterations has now expired. The case of the Charles River bridges is the first in the history of the government in which a Secretary of War or other national officer, in the exercise of a high discretionary power delegated by Congress, has undertaken to compel the reconstruction in this harbor of tide-water bridges long established and maintained under the hitherto unquestioned sanction of State law; and the outcome will be awaited with much interest.

By an act of the Massachusetts Legislature, passed in 1888, the cities of Boston and Cambridge were required to widen the draws in the four highway bridges which cross Charles River next above the Harvard bridge, to 36 feet each. For reasons stated in the last report, there was some delay in complying with the act. The work has been taken in hand by the cities the past year, and, in the case of three of the bridges, the widening is now well under way or nearly finished.

The new Harvard bridge still remains unopened to travel. The delay has been due to a contest in the courts respecting the manner of constructing the avenue of approach to the bridge on the Cambridge side. The supreme judicial court has just decided that the city of Cambridge had authority, under the act of 1882, chapter 155, to lay out the avenue on its own side of Charles River at grade across the Boston and Albany railroad; that the act did not require that the city of Boston should concur in or agree to such lay-out; and that the board of railroad commissioners had no authority to order the construction by the city of Cambridge of an overhead crossing over the railroad. This decision covers all the points in controversy, and there seems to be no reason for longer delay in the completion of the avenue and the much-desired opening of the bridge to the public. As compared with all the other bridges on the river, it is a model in construction and even in architectural effect.

The private improvements in Charles River basin have been pushed vigorously the past year. The Charles River Embankment Company has extended its sea-wall about 500 feet westerly, and has dredged from the basin over 32,000 cubic yards for filling. The contractors are preparing for larger operations the present year with improved appliances. On the Boston side, the filling of the Adams estate is completed, and on the adjoining estate the sea-wall is finished to Cousens' wharf, and the filling well advanced. Substantially all the filling has been dredged from the basin, improving its navigation, its sanitary condition and its beauty.

HARBOR LINES IN BOSTON HARBOR.

A harbor line board, consisting of General Abbott, Colonels Gillespie and Mansfield, and Major Livermore, Corps of Engineers, U. S. Army, was constituted by order of the Secretary of War in 1888, under section 12 of the river and harbor act of that year, to consider harbor lines in Boston harbor. At the date of the last report, lines had been defined for some of the principal frontages of the harbor, which were described in that report.

During the past year, the harbor line board has recommended lines for substantially the whole of the harbor and its estuaries not covered the previous year, and these lines have been approved by the Secretary of War.

The sections of the harbor treated the past year are a part of the banks of the Charles River, the Mystic River and its tributaries, Chelsea Creek, the shore of East Boston from Jeffrey's Point to Breed's Island, and Dorchester Bay from South Boston to Moon Island.

In almost every case where the State had previously established harbor lines, these lines have been adopted without modification by the harbor line board as the lines beyond which no structure of any kind shall extend. In some cases, an inner "*bulkhead line*," beyond which no *solid filling* shall hereafter be permitted, has also been defined. The lines have in some instances been extended farther up the rivers or along the shore than had been done by the State. In other respects, and upon the whole, the harbor line system already established by the laws of the State has been approved and confirmed.

Descriptions of the several lines recommended by the harbor line board and approved by the Secretary of War during the last year, are appended to this report.* Copies of two of the charts, on which the more important lines in the Charles and Mystic rivers are laid down, are also annexed. Copies of the charts on which all of the lines are shown, are on file in this office. For official copies of these charts, and of the documents containing the descriptions and

* See Appendix, A.

approval of the several lines, this board has been indebted to the courtesy of the harbor line board.

LEGISLATION BY CONGRESS.

The river and harbor acts of 1884 and 1888 had inserted in them certain sections, in the nature of general laws, relating to bridges, harbor lines and the removal of wrecks in navigable waters, the provisions of which have been stated and explained in previous reports.

In the recent river and harbor act of September 19, 1890, those sections have been amended in some particulars, and other sections have been inserted extending their scope, providing severer penalties for their violation, and delegating larger discretionary powers to the Secretary of War. For information and convenience of reference, the sections of the act of 1890, 4 to 12 inclusive, are appended to this report.*

The control of Congress over waters within the limits of a State, whether fresh or tide waters, is incidental to its power, under the constitution of the United States, "to regulate commerce with foreign nations and between the several States." Its right of control is therefore limited to such waters within the several States as are accessible to and navigable by vessels engaged in foreign or interstate commerce. It extends only to such water-ways and water areas as are suitable and necessary for the convenient passage and safe anchorage of such vessels. It does not extend to all the tide waters, any more than to all the fresh waters, within State limits; nor does it include the regulation of their use and improvement for any other purposes than those of navigation.

In the absence of legislation by Congress, the questions that have hitherto arisen have been chiefly those affecting the extent and limits of the powers of the States in respect to the regulation of waters within their confines. Now that Congress has undertaken to legislate in this direction, questions are not unlikely to arise touching the extent and limits of the power of the national government in the regulation of State waters.

* See Appendix, B.

SOUTH BAY.

This bay has never been regarded of much if any value as a tidal reservoir of the main harbor, and the project of filling up the whole of it, as well as Fort Point channel which is its outlet, was recommended not many years ago by a committee of the legislature. The commerce in the bay, and especially along the channel, is now of too much importance to admit of the serious consideration of such a scheme.

Harbor lines were established in a portion of the bay as early as 1847, by chapter 278 of the acts of that year. These lines were extended around the entire bay by chapter 293 of the acts of 1856, and were slightly modified by chapter 310 of the acts of 1864.

Since these lines were established, the New York and New England railroad has been built solid across the bay, excepting a pile section of about 260 feet, and the part cut off by the railroad is no longer used or has any real value for navigation. The natural size of the bay was considerably enlarged some 40 to 50 years ago by digging away the marshes, to about the level of low water, for filling elsewhere. This artificial area, and other portions of the bay which are bare at low tide, are at times offensive and noisome.

There can be little question that it would be a public improvement to fill some portions of the bay and to deepen others. This can be done in such a way as to increase rather than diminish the present facilities for wharves and navigation. The harbor lines stand in the way of such improvement.

An act was passed in 1871, chapter 335, authorizing changes in the lines with reference to a similar improvement then in contemplation but not carried out. The present powers of this board under that act, by reason of subsequent legislation and upon other grounds, are not clear. It is recommended that such legislation be now had as will remove any obstacles which the existing harbor lines present to the improvement of the bay, under proper guards and limitations, in the direction above indicated.

MYSTIC RIVER IMPROVEMENT.

This work involves the filling and improvement of about 90 acres of land and flats lying between the north and south channels of Mystic River. The original grant was to the Mystic River Corporation, in 1855, upon the condition of deepening and improving the river.

The Boston and Maine Railroad, which has acquired the rights and assumed the obligations of the original grantee, has completed the past year the bulkhead on the line of Elm Street extended, and tide water is now excluded from the whole tract of 90 acres. The platform along the face of the wharf below Chelsea bridge has been finished, and also above the bridge to a point about 150 feet beyond the dock; and more than half the piles have been driven for its remaining length.

The dredging the last year has been done in the river above Chelsea bridge; but only a very small part of the excavation has been to the required depth. About 280,000 cubic yards of dredged material have been deposited on the enclosed area, mostly by methods of re-handling which are new to Boston harbor, and which have worked in a satisfactory manner.

The amount of filling and of required excavation in the river which remain to be done, is very much larger than can be accomplished, by the methods and apparatus now in use, within the time allowed by statute for the completion of the whole work, which expires March 1, 1891. A reasonable extension of the time may properly be granted.

GLOUCESTER, ESSEX AND IPSWICH BOUNDARY LINES.

This board was directed, by chapters 77 and 97 of the resolves of 1889, to examine and define the boundary lines in tide water between the city of Gloucester and town of Ipswich, and between the towns of Essex and Ipswich, and to report to the next General Court.

A partial report was made to the last legislature. The survey and map of the territory in dispute, then under way, have been completed the past year. A copy of the

map, much reduced in size, on which the proposed boundary lines as defined by the board are laid down, is annexed to this report.

The water area in controversy is a tidal bay, about a mile in diameter and four square miles in extent. Much the larger part of it is dry at low water. Upon considerable portions of the flats, clams are found in abundance. Each city and town has the right by statute to regulate the taking of clams within its own limits. Hence arose the question, which the courts declined to settle, as to the boundaries in the present case.

The Essex River enters the bay at its south-westerly corner, and the Castle Neck River at its north-westerly corner; and both rivers flow out through the bay, between Castle Neck in Ipswich and Two Penny Loaf in Gloucester, to the sea.

No doubt has been felt about the proper location of the tide-water line for dividing the city of Gloucester from the towns of Essex and Ipswich. The present land line between Gloucester and Essex has been extended in the same course across the bay, and out through its mouth to the exterior line of the Commonwealth in tide water as defined by this board under chapter 196 of the acts of 1881. The map is not large enough to show its stretch beyond the mouth of the bay.

The only difficulty is in regard to the tide-water line between Ipswich and Essex. The second parish of Ipswich was set off and incorporated into the town of Essex by chapter 85 of the acts of 1818. That part of the boundary line between the old and the new town which is here concerned, is described in the act as "running down said brook to the creek, so called; thence continuing down said creek to the river; thence *down the channel of said river on the north side of Hog Island to the sea.*"

The *river* referred to is the Castle Neck River; and if that river had always kept to one and the same channel, no question would have arisen as to the boundary between the towns. On the contrary, the river has had at different times two very different channels. One, the present

channel as shown on the map, extends along the shore of Castle Neck on the north side of the bay. By the other, the river, after passing Story Island and the thatch banks, turns south, and runs down on the easterly side of Dilly Island and the adjoining marsh, and unites with the Essex River near Cross Island. The southerly portion of the last described channel is still open, as indicated on the map.

In 1792, as proved by ancient town maps, the river was flowing in the Castle Neck channel. Before 1830, it had shifted to the Dilly Island channel. The coast survey map of 1857 shows that it was then in the Dilly Island channel. Some six or seven years ago, owing probably to the damming of ice, it broke through the loose and shifting sand, and resumed the old channel along Castle Neck, where it now runs.

The changes from one channel to the other, which are liable to occur at any time from natural causes, have not been gradual but more or less sudden, and when one channel has opened, the other has closed up. If, then, "the channel of said river" is held to be the boundary line, a very large body of flats will be found sometimes in the one town and sometimes in the other.

It has seemed best, therefore, to divide the bay, as fairly as may be, by lines which are fixed and easy to run out. A cluster of rocks on the flats, known as the Black Rocks, is the only permanent landmark in the bay. A copper bolt has been placed in the highest point of the main ledge of these rocks for a monument.

As defined by the board and shown on the map, the boundary line in tide water between Ipswich and Essex begins at a point in the line which divides the city of Gloucester from said towns, which point bears South 40° East and is distant $435\frac{7}{100}$ feet from the copper bolt; and runs thence North 40° West, passing through the copper bolt, until it comes to the channel of Castle Neck River on the north side of Choate's (formerly called Hog) Island. This line gives a larger portion of the flats to Ipswich, and a larger portion of the best clam-ground to Essex.

The boundary line in tide water which divides the city of Gloucester from the towns of Essex and Ipswich, as defined

by the board and shown on the map, begins at a stone bound near the shore in the land line between Gloucester and Essex; and runs thence North $29^{\circ} 30'$ East across the bay, passing through the south-easterly end of the line between Ipswich and Essex as above described, and out to sea until it comes to the exterior line of the Commonwealth in tide water. This line, as before stated, is an extension of the present land line between Gloucester and Essex.

As often as occasion may require, these lines can be run and staked out across the clam-grounds and flats, from the copper bolt and stone bound, one or both, by an engineer or surveyor, without difficulty. The courses as given above refer to the true meridian, and allowance must be made for variations of the magnetic needle.

FIELD AND OFFICE WORK.

Miscellaneous Surveys.

The work on the South Boston flats has, as usual, occupied the larger part of the time of the Engineer and his assistants.

In February, a survey and plan were made of the locations of the mooring buoys below Charles River bridge, for use in the hearing on a complaint that they were dangerous obstructions to steamers entering and leaving the Hoosac Tunnel docks.

A survey and plan were also made of the railroad bridge over Belle Isle Inlet, between Breed's Island and Winthrop, with reference to the plans for building the metropolitan sewer across the inlet.

In June, the positions of seventeen stations in the South Bay were determined by triangulation from the basis of the harbor re-survey, and the positions calculated and plotted on plane-table sheets, preparatory to making plans of the bay as soon as other work permits.

A survey was also made of the section of Fort Point channel between the New York and New England Railroad and Congress Street bridges, and between the draw-piers of the bridges and the wharf of the Boston Electric Light

Company, and plans and specifications drawn for dredging this section to the depth of 16 feet below mean low water.

A survey was also made of Salter's Beach in Plymouth, for a short distance north of Gurnet Light, to determine to what extent, if any, the beach had been or would be injured by the removal of fine drift-gravel, under licenses given to Mr. Joseph L. Boardman, as authorized by chapter 212 of the acts of 1881. The comparison of this survey with that of June, 1889, did not show that any material change in the beach had taken place.

In July, a plane-table survey was completed and map made, based on the triangulation done in November, 1889, as stated in the last report, of the bay at the mouth of the Essex and Castle Neck rivers, for use in defining the boundary lines in tide water between Gloucester, Ipswich and Essex, as already described in this report.

In October, an examination was made of the banks of the Connecticut River at Springfield and West Springfield, to ascertain the extent of the giving away and exposure of the banks on the West Springfield side, and of the encroachments on the Springfield side.

In October and November, a survey was made of the section of the Merrimac River and its banks lying between Haverhill and Bradford. Twenty-two triangulation points were established and connected with the work of the coast survey through the work of Professor Quimby in the determination of the state line between Massachusetts and New Hampshire. Based on these points, two plane-table sheets were made, on a scale of $\frac{1}{10000}$, showing the river from the Boston and Maine railroad bridge down to a little below the junction of Water and Groveland streets in Haverhill,—a distance of $1\frac{3}{4}$ miles. The sheets include the river and its shores between Washington, Merrimack and Water Streets on the Haverhill side, and the Georgetown Branch railroad on the Bradford side. There remains a few days' work on the Bradford side to complete the lower sheet.

This survey is preparatory to the establishment of harbor lines on the Haverhill and Bradford banks of the river, one or both.

Licenses Granted During the Year 1890.

The following licenses, eighty-one in number, have been granted the last year. The licenses which are required under recent statutes for structures in the Connecticut River and in great ponds, as well as those in tide waters, are included in the list.

Nos.

1226. Petition of the American Powder Mills for license to place a mooring for one of its powder-boats on the South Boston flats in Boston harbor. Granted January 23, 1890.
1227. Petition of the Boston, Revere Beach and Lynn Railroad Company for license to build a ferry-slip at its Boston terminus in Boston harbor. Granted January 30, 1890.
1228. Petition of the Boston Land Company for license to fill solid in Chelsea Creek at Breed's Island in East Boston. Granted January 30, 1890.
1229. Petition of Selina C. Washburn for license to fill a dock adjoining her wharf on Malden River in the city of Malden. Granted February 20, 1890.
1230. Petition of the Old Colony Railroad Company for license to fill solid the pile bridge of the Nantasket Beach railroad across an arm of Hingham Bay, near Point Allerton, in the town of Hull. Granted February 20, 1890.
1231. Petition of William Minot, Jr., for license to drive piles at his wharf on Charles River in the city of Boston. Granted February 27, 1890.
1232. Petition of the Boston and Maine Railroad for license to rebuild and widen the pile platform at Mystic wharf on the south channel of Mystic River in the city of Boston. Granted February 27, 1890.
1233. Petition of the city of Boston for license to dump snow and ice into the rivers and tide waters in and around said city. Granted March 6, 1890.
1234. Petition of the city of Salem for license to build stone piers to support water and gas pipes at North Street bridge on North River in the city of Salem. Granted March 6, 1890.
1235. Petition of the North Packing and Provision Company for license to build a wharf and well on Miller's River in the city of Somerville. Granted March 6, 1890.

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Nos.

1236. Petition of Colcord Upton for license to build a wharf at Baker's Island in Massachusetts Bay in the city of Salem. Granted March 6, 1890.
1237. Petition of Simon P. Humphrey for license to build a pile wharf in Onset Bay in the town of Wareham. Granted March 13, 1890.
1238. Petition of Annie H. Litchfield for license to build a sea-wall or bulkhead and fill solid in Hull Bay in the town of Hull. Granted March 13, 1890.
1239. Petition of the Central Railroad of New Jersey for license to widen and extend Phillips wharf, on piles, in Salem harbor in the city of Salem. Granted March 13, 1890.
1240. Petition of Joseph H. Burgess for license to build a wharf, partly solid and partly on piles, in Onset Bay in the town of Wareham. Granted March 20, 1890.
1241. Petition of Daniel H. J. Holmes and Mary F. Gaff for approval of plans for building a bridge across Centreville River in the town of Barnstable, as authorized by chapter 36 of the acts of 1890. Approved March 20, 1890.
1242. Petition of the Bunker Hill Yacht Club for license to build a club-house, on piles, near the south draw of Chelsea bridge on Mystic River in the city of Boston. Granted March 25, 1890.
1243. Petition of the city of Lynn for license to build an outfall sewer in Lynn harbor in the city of Lynn. Granted March 27, 1890.
1244. Petition of the East Boston Dry Dock Company for license to build a marine railway, and to widen and extend its northerly pier, on piles, in Boston harbor at East Boston. Granted April 10, 1890.
1245. Petition of the city of Newburyport for approval of plans • for building a sewer outfall in Merrimack River in the city of Newburyport, as authorized by chapter 233 of the acts of 1889. Approved April 17, 1890.
1246. Petition of the Boston and Albany Railroad Company for license to rebuild the bridge on its Grand Junction branch railroad across Mystic River in the city of Somerville and town of Everett. Granted April 17, 1890.
1247. Petition of James H. Winchell & Company for license to build stone piers for the support of a building on Little River in the city of Haverhill. Granted April 24, 1890.

Nos.

1248. Petition of F. A. Merriam & Company for license to build a pile platform, fill solid, and dredge a channel in Dorchester Bay in the city of Boston. Granted April 24, 1890.
1249. Petition of Isaac Pratt, Jr., for license to fill solid at the McKay wharf in Boston harbor at East Boston. Granted May 1, 1890.
1250. Petition of James N. Cowin for license to widen and extend his wharf by filling solid on Mystic River in the town of Medford. Granted May 8, 1890.
1251. Petition of Charles Bassett for license to build a dike with a tide-gate therein across Buck's Creek in the town of Chatham. Granted May 15, 1890.
1252. Petition of John C. Haynes for license to widen a portion of Liverpool wharf, on piles, on Fort Point channel in the city of Boston. Granted May 15, 1890.
1253. Petition of Ezra B. Whittier for license to build a pile pier in Winthrop harbor in the town of Winthrop. Granted May 22, 1890.
1254. Petition of Wilhelmina C. Clifford for license to build a timber wharf in Buzzard's Bay in the town of Dartmouth. Granted May 22, 1890.
1255. Petition of the King Philip Boat Club for license to build a boat-house in Mount Hope Bay in the city of Fall River. Granted May 22, 1890.
1256. Petition of the Lincoln Boat Club for license to build a boat-house in Sandy Pond in the town of Lincoln. Granted May 22, 1890.
1257. Petition of George R. Bradford for license to extend his wharf, on piles, in Gloucester harbor in the city of Gloucester. Granted May 22, 1890.
1258. Petition of the Lockwood Manufacturing Company for license to extend its wharf by filling solid in Boston harbor at East Boston. Granted May 29, 1890.
1259. Petition of the city of Gloucester for license to build a catch-basin in Gloucester harbor in the city of Gloucester. Granted May 29, 1890.
1260. Petition of the Chelsea Yacht Club for approval of plans for building a club-house, on piles, near Chelsea bridge on Mystic River in the city of Chelsea, as authorized by chapter 311 of the acts of 1890. Approved May 29, 1890.
1261. Petition of the Simpson's Patent Dry Dock Company for license to extend its dry dock No. 1 in Boston harbor at East Boston. Granted May 29, 1890.

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Nos.

1262. Petition of the Commercial Wharf Company for license to extend the south pier of Commercial wharf, on piles, in Boston harbor in the city of Boston. Granted May 29, 1890.
1263. Petition of William H. Swift & Company for license to extend their wharf by filling solid on Chelsea Creek at East Boston. Granted June 5, 1890.
1264. Petition of the Constitution Wharf Company for license to drive piles at Constitution wharf in Boston harbor in the city of Boston. Granted June 5, 1890.
1265. Petition of Emma J. Goodnow for license to build a wharf, partly solid and partly on piles, in Lake Quinsigamond in the city of Worcester. Granted June 12, 1890.
1266. Petition of Augustus T. Cushing and others for license to build a pile wharf and float in Town River Bay in the town of Weymouth. Granted June 12, 1890.
1267. Petition of the city of Boston for license to rebuild Federal Street bridge on Fort Point channel in Boston harbor. Granted June 19, 1890.
1268. Petition of James A. Norcross for license to build a pile wharf at Monument Beach in the town of Bourne. Granted June 19, 1890.
1269. Petition of the Gloucester Lighterage Company for license to build a wharf, partly solid and partly on piles, in Gloucester harbor in the city of Gloucester. Granted June 19, 1890.
1270. Petition of John Girdler for license to widen his wharf, partly solid and partly on piles, in Beverly harbor in the town of Beverly. Granted June 26, 1890.
1271. Petition of the board of Park Commissioners of the city of Boston for approval of plans for filling solid in Boston harbor at South Boston Point in said city, as authorized by chapter 438 of the acts of 1889. Approved June 26, 1890.
1272. Petition of William O. Cutter for license to build a pile wharf and float-stage in Onset Bay in the town of Wareham. Granted July 3, 1890.
1273. Petition of Isaac Pratt, Jr., for license to build a pile platform at the McKay wharf in Boston harbor at East Boston. Granted July 10, 1890.
1274. Petition of the Gardner Boat Club for license to build a boat-house in Crystal Lake in the town of Gardner. Granted July 10, 1890.

Nos.

1275. Petition of William B. Nelson for license to extend his wharf in Mattapoisett harbor in the town of Mattapoisett. Granted July 17, 1890.
1276. Petition of Charles H. Heath, trustee, and the Riverbank Improvement Company for license to build a sea-wall and fill solid on Charles River in the city of Boston. Granted July 17, 1890.
1277. Petition of Edward Kendall & Sons for license to extend their wharf, partly solid and partly on piles, on Charles River in the city of Cambridge. Granted July 17, 1890.
1278. Petition of the Brookline Gas Light Company for license to build a sea-wall and pile platform and to fill solid on Charles River in the city of Boston. Granted July 17, 1890.
1279. Petition of John M. Brooks for license to drive piles for launch-ways and for other purposes in Boston harbor at East Boston. Granted July 24, 1890.
1280. Petition of the Lockwood Manufacturing Company for license to widen and extend its wharf, on piles, in Boston harbor at East Boston. Granted July 24, 1890.
1281. Petition of William B. Thom & Company for license to build a stone wharf on Merrimack River in the city of Haverhill. Granted August 7, 1890.
1282. Petition of the Haverhill Iron Works for license to build a stone wharf on Merrimack River in the city of Haverhill. Granted August 7, 1890.
1283. Petition of the city of Cambridge for license to rebuild and widen its portion of River Street bridge on Charles River in the city of Cambridge. Granted August 22, 1890.
1284. Petition of the city of Boston for license to widen its portion of River Street bridge on Charles River in the city of Boston. Granted August 22, 1890.
1285. Petition of the Haverhill Electric Light Company for license to extend its wharf by filling solid on Merrimack River in the city of Haverhill. Granted September 4, 1890.
1286. Petition of the Boston and Maine Railroad for license to excavate a channel and build a culvert with a tide-gate therein on Diamond Creek in the town of Revere. Granted September 4, 1890.

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Nos.

1287. Petition of the city of Boston for license to widen the passage-way for vessels in North Harvard Street bridge on Charles River in the city of Boston. Granted September 11, 1890.
1288. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for rebuilding the tidal culvert crossing Saratoga Street in East Boston, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1289. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a portion of section 9 of a main sewer in Chelsea Creek, within the location of Addison Street at East Boston, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1290. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a pile wharf in Boston harbor at Deer Island, as authorized by chapter 439 of the acts of 1889. Approved September 18, 1890.
1291. Petition of the town of Winthrop for license to widen Shirley Street in Boston harbor near Cottage Hill in the town of Winthrop. Granted September 25, 1890.
1292. Petition of William Campbell and Wilson Campbell for license to fill flats in Charles River in the city of Cambridge. Granted September 25, 1890.
1293. Petition of Josiah C. Bennett for license to build seawalls and fill flats in Lynn harbor in the city of Lynn. Granted October 2, 1890.
1294. Petition of the city of Boston for license to extend L Street in Boston harbor at South Boston. Granted October 2, 1890.
1295. Petition of Leavitt T. Robbins for license to extend his wharf by filling solid in Plymouth harbor in the town of Plymouth. Granted October 2, 1890.
1296. Petition of Roswell C. Downer for license to build a stone breakwater at Nye's Neck in the town of Falmouth. Granted October 16, 1890.
1297. Petition of the city of Boston for license to widen the passage-way for vessels in Essex Street bridge on Charles River in the cities of Boston and Cambridge. Granted October 23, 1890.

Nos.

1298. Petition of the board of County Commissioners of Hampden County for approval of plans for building a bridge across Connecticut River between the city of Holyoke and the town of Chicopee, as authorized by chapter 350 of the acts of 1889. Approved October 30, 1890.
1299. Petition of the board of County Commissioners of Essex County for approval of plans for building a bridge across Powow River in the town of Amesbury, as authorized by chapter 66 of the acts of 1890. Approved October 30, 1890.
1300. Petition of George A. Hall for license to build a wharf by filling solid on Merrimack River in the city of Haverhill. Granted November 6, 1890.
1301. Petition of Choate Burnham for license to widen and extend his wharf, on piles, in Old Harbor Bay in the city of Boston. Granted November 6, 1890.
1302. Petition of Albin M. Richards for license to extend his wharf by filling solid on Mystic River in the city of Boston. Granted November 25, 1890.
1303. Petition of the Riverside Boat Club for license to build a boat-house, on piles, on Charles River in the city of Cambridge. Granted November 25, 1890.
1304. Petition of the West End Street Railway Company for license to dump snow and ice from bridges and wharves into tide waters in the cities of Boston, Cambridge and Chelsea, and the town of Medford. Granted December 4, 1890.
1305. Petition of the city of Boston for license to build a pile pier at the north ferry in Boston harbor at East Boston. Granted December 4, 1890.
1306. Petition of the West End Street Railway Company for license to build a pile wharf in South Bay in the city of Boston. Granted December 4, 1890.

RECEIPTS FROM GRANTS OF PUBLIC LANDS.

The amount received during the past year for grants of rights and privileges in lands of the Commonwealth, under licenses of this board for filling and for the erection of wharves and other structures in and over tide waters and great ponds, is \$14,330.24. Other like assessments for a considerable amount have been made during the year, for

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which the money has not yet been paid into the treasury. Payment for such grants was first required by chapter 284 of the acts of 1874, now chapter 19, section 16, of the Public Statutes. Since the passage of that act, the total amount so received and paid into the State treasury has been \$274,894.60.

HARBOR IMPROVEMENTS BY THE UNITED STATES.

The works of the national government for the preservation and improvement of the rivers and harbors on the coast of Massachusetts, have remained under the supervision of the same able and efficient officers of the Corps of Engineers, U. S. A., who had charge of them at the date of the last report, — those on the Eastern section of the coast in charge of Lieut. Col. Samuel M. Mansfield, who is stationed at Boston, and those on the Southern section in charge of Maj. William R. Livermore, whose headquarters are at Newport.

To both of these gentlemen, as to their predecessors, this board is indebted for courteous coöperation, and the public for valuable service.

Improvements on the Eastern Coast of Massachusetts.

At the request of the board, Colonel Mansfield has kindly furnished the following condensed report of the work done in the rivers and harbors under his charge during the year 1890: —

UNITED STATES ENGINEER OFFICE,
BOSTON, MASS., December 22, 1890.

The Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN: — In accordance with your request of this day, I have the honor to furnish the following summary of the work done by the general government, during the year, in those rivers and harbors of Massachusetts which are under my charge: —

1. Newburyport Harbor.

The general project for the improvement of this harbor has not been changed.

No active operations have been in progress, and the condition

of the several works of improvement remains essentially as stated in the report for last year.

The entrance channel over the bar has straightened and deepened, as shown by the survey of June, 1890.

The funds provided for this work by the act of September 19, 1890, \$25,000, will be expended during the next working season in extending the full section of the north jetty.

2. *Harbor of Refuge, Sandy Bay, Rockport.*

No change has been made in the project.

During the year 40,039 tons of rubble-stone were deposited in the breakwater, and its sub-structure is now essentially completed between cross ranges 140 and 3,540.

The present available funds will deposit, approximately, 185,000 tons of stone in the sub-structure, and will extend it about 750 feet.

3. *Gloucester Harbor.*

The condition of the improvement remains as stated in the report for last year, no work having been done.

The sum of \$15,000 now available will be expended in widening the channels in Harbor Cove 100 feet, and in completing the proposed improvement of the main harbor from its entrance to the steamboat wharf.

4. *Manchester Harbor.*

No change has occurred in the condition of this improvement. During the next working season, a channel 40 feet wide, and 4 feet deep at mean low water, will be dredged from the entrance of the harbor to the railroad bridge.

5. *Salem Harbor.*

The funds provided for this harbor by the act of September 19, 1890, will be expended in dredging a channel 50 feet wide from deep water off Derby wharf light to the head of navigation in South River. This channel will be 8 feet deep at mean low water to near the inner end of Derby wharf, and thence 6 feet deep.

6. *Lynn Harbor.*

No change has taken place in the condition of this improvement since the date of the last report. The present available funds will be expended in completing the anchorage basin and in widening the inner channel.

7. *Winthrop Harbor.*

The funds now available for this harbor will be expended in dredging a channel 3 feet deep at mean low water, and 35 feet wide, from the entrance to Rice's wharf.

8. *Boston Harbor.*

No change has been made in the general project for the improvement of this harbor. During the year the ledges uncovered by dredging at the Upper Middle were removed, and repairs were made to the north head sea-wall at Deer Island.

A detailed survey of the west end of Brewster spit showed that the main ship-channel had decreased in width, since it was dredged in 1874, to such an extent that the 23-foot curves, at mean low water, were but 475 feet apart.

The funds now available for this harbor will be expended in widening the main ship-channel, at the west end of Brewster spit, to the full projected width, 625 feet; in extending the Gallop's Island sea-wall about 300 feet to the south-east; in repairing the sea-wall at Great Brewster; in extending the rip-rap shore protection at Long Island; in widening and deepening the channel between Nix's Mate and Long Island so that it will be 300 feet wide, 15 feet deep at mean low water; in widening the channel leading to Nantasket beach so that it will be 150 feet wide, 9½ feet deep at mean low water; in extending the main ship-channel from Grand Junction wharf towards Jeffrey's Point, approximately 300 feet wide, 18 feet deep between Grand Junction wharf and the most eastern dry dock, thence gradually shoaling to a junction with 15 feet depth off Jeffrey's Point; in continuing the improvement of Charles River when the draws in the upper bridges shall have been altered; and for such other dredging, blasting, or repairs of sea-walls as may be found necessary.

9. *Hingham Harbor.*

No change has occurred in the condition of this improvement. The funds now available will be expended in deepening the channel to 10 feet at mean low water.

10. *Scituate Harbor.*

The project for the improvement of this harbor has not been changed. During the next working season the present available funds will be applied in widening and deepening the channel connecting the anchorage basin with the town wharves, so that it will be 100 feet wide, 3 feet deep at mean low water.

11. Plymouth Harbor.

No change has occurred during the year. The funds provided by the act of September 19, 1890, will be expended in completing the basin, and in widening the channel of approach to 130 feet.

12. Wellfleet Harbor.

The general project of improvement remains unaltered.

No work has been done during the year, nor is any expected immediately, as the funds provided for this harbor by the last river and harbor act are not sufficient to effect any appreciable benefit to commerce.

13. Provincetown Harbor.

No work was done during the year. A bulkhead about 2,000 feet long will be built, during the coming working season, on the inside of Long Point to cover its weakest section, about $\frac{1}{2}$ mile north-west of Wood End Light.

14. Merrimack River.

No work has been done during the year, and the funds now available are specifically appropriated for the improvement of Mitchell's Falls.

15. Powow River.

No action by the town authorities of Amesbury, in the matter of the drawbridge, has as yet been reported to this office, which will warrant the expenditure of the funds now available.

16. Ipswich River.

No change in the condition of this improvement has occurred. The funds now available are not sufficient to complete the present project.

17. Weymouth Fore River.

The general project for the improvement of this river is to widen and deepen the natural channel, so that six feet depth at mean low water can be carried to the head of navigation. The projected channel will be 100 feet wide to near the wharves at Weymouth Landing, thence to Braintree bridge 80 feet wide, and above the bridge 50 feet wide.

The present available funds will be applied in dredging a channel of the full projected depth, 40 feet wide to Braintree bridge, and 25 feet wide above this bridge.

During the year surveys have been made, and projects of improvement are being considered, for the following localities: Kingston harbor, Weymouth Back River, Town River, Chatham harbor, Essex River, Mystic and Malden rivers.

It will be noticed that but little progress has been made in most of the improvements during the year. This is owing to the exhaustion of the funds provided by the act of 1888, and the very late date during the present year when additional funds were provided.

Very respectfully, your obedient servant.

S. M. MANSFIELD,
Lieutenant Colonel of Engineers.

Improvements on the Southern Coast of Massachusetts.

The board is indebted to the courtesy of Major Livermore for a copy of the official report of the work done in the rivers and harbors under his charge during the year ending June 30, 1890, from which the following facts are taken:—

1. *Hyannis Harbor.*

No work was done during the year ending June 30, 1889. During the last year the work of dredging in the 15½-foot anchorage ground protected by the breakwater, was resumed with dredge, tug and scows belonging to the general government. The execution of the project of deepening this anchorage area will be continued.

The amount available for the work, including an appropriation of \$8,000 by the river and harbor act of September 19, 1890, is \$9,916.00.

2. *Nantucket Harbor.*

During the last year 6,055 tons of stone have been placed in the eastern jetty under a contract, and 830 tons with plant belonging to the United States.

It was reported in May, 1890, that the steam-boat running to Nantucket had difficulty in entering the harbor on account of the shoaling of the channel. A survey in June showed that the 7½-foot channel still existed, but that it was to the eastward of the course followed by the steam-boats, and about in the same position as the preceding November.

It is proposed to continue the construction of the eastern jetty as far as the funds will permit. The amount available, including

\$25,000 appropriated by the river and harbor act of 1890, is \$25,048.70.

3. *Vineyard Haven Harbor.*

The plan of improvement contemplates the protection of the chops at the mouth of the harbor from the action of storm waves, by jetties and other works along the shore.

A temporary wharf and three jetties, 150 feet, 80 feet, and 100 feet long, were completed on the West Chop the last year. The work of protection will be continued, beginning at the East Chop.

The amount available, including \$10,000 appropriated by the river and harbor act of 1890, is \$11,661.00.

4. *Wareham Harbor.*

The dredging of the southern half of Reach No. 8 to a width of 175 feet and depth of 10 feet was completed, and the Middle Ground, a shoal in mid-channel of Reach No. 9, was removed, during the last year.

The amount available for continuing the improvement, including an appropriation of \$5,000 by the river and harbor act of 1890, is \$5,031.47, which will be applied to the completion of the channel and the further building up of Long Beach.

5. *New Bedford Harbor.*

During the last year, 43,665 cubic yards of mud, sand and gravel were dredged in excavating a channel, 100 feet wide and 18 feet deep at mean low water, from the deep water of Buzzard's Bay, near the 11-foot bank, to the vicinity of the New Bedford wharves.

The work of dredging in the new channel will be continued with the funds available, \$10,033.98, including an appropriation of \$10,000 by the river and harbor act of 1890.

6. *Edgartown Harbor.*

The sum of \$2,000 was appropriated by the river and harbor act of 1890 for improving the inner harbor by dredging, and will be expended for that purpose.

7. *Taunton River.*

No work was done in this river the last year. The sum of \$7,012.78 now available, including an appropriation of \$7,000 by the recent river and harbor act, will be applied in completing the

widening and deepening of the channel at a few points above Berkley bridge. and in the removal of a small amount of ledge rock uncovered in dredging below the bridge.

Vessels of 11 feet draught can now reach Taunton at the head of navigation.

CONNECTICUT RIVER.

The "general care and supervision of the Connecticut River within the confines of this Commonwealth, and of the banks thereof, and of all structures therein," were committed to this board by chapter 344 of the acts of 1885. This was done "in order to prevent and remove unauthorized encroachments and causes of every kind which may in any way injure the said river, and in order to protect and develop the rights and property of the public therein."

As a means of securing these ends, it was provided in the act that all persons authorized by the general court to build any structures in the river, should first obtain from this board its approval of the plans and mode of performing the work; and the board was further empowered to license the building of structures in the river upon such terms as it should prescribe. The provisions of chapter 19 of the Public Statutes applicable to structures in tide waters, were in general made applicable to structures in this river.

Since the passage of this statute, the board has not infrequently been called upon to approve and license new structures, or to investigate cases of actual injury or threatened danger from the natural action of the river, or from structures built and encroachments made by riparian owners and others. There is evident need of the regulation and protection which the act was designed to secure, and its provisions will prove more useful as they come to be better known and understood.

In order, however, that the statute may fully accomplish the desired results, there should be a more prompt and effectual remedy than it now provides for the prevention and abatement of unauthorized and injurious works.

It is provided in chapter 19, section 17, of the Public Statutes, that every erection and work made or done in *tide water* without authority from the general court or from

this board, or in a manner not sanctioned by the board where its approval or license is required, shall be deemed a public nuisance, and be liable to indictment as such; and that the board may order suits on behalf of the Commonwealth to prevent or stop any such nuisance by injunction or otherwise; and that the attorney-general and district attorneys within their districts shall conduct such suits. The same provision is found in chapter 318, section 6, of the acts of 1888, for the protection of *great ponds*. It is recommended that similar provision be made for the more effectual protection of the Connecticut River.

Protective Works at Hadley.

The work authorized by the General Court to be done under the direction of this board "to prevent the further inroads of the Connecticut River upon the northerly side of the town of Hadley, and the destruction of the principal streets in said town," has been completed. The necessity for undertaking the work, and the methods of conducting it, have been explained in previous reports.

The operations of the last year, and the success of the work so far as its results can now be known or foreseen, are detailed in the following report of Mr. Emory C. Davis of Northampton, who has been the engineer in immediate charge of the work from the beginning, conducting it with much skill and good judgment, and to the entire satisfaction of the board:—

To the Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN:—The following is a report upon the work done the past year for the protection of the town of Hadley against the further encroachments of the Connecticut River upon said town, as provided for by chapter 95 of the resolves of 1888, and chapter 17 of the resolves of 1889, of the legislature of Massachusetts.

The work done during the summer and fall of 1889, in sloping the banks of the river and laying mats and riprapping thereon, was set the past spring with young willows, and these have made a satisfactory growth during the summer, and will serve as a support for the riprap work after the decay of the mats above the water line.

Soundings were taken in June last, on the same lines across the river as in previous years, to ascertain what changes, if any, had taken place in the general character and profile of the river bottom since the commencement of the protective works in 1888. These soundings are shown on the accompanying profiles of the river bottom. The black lines indicate the contour of the bottom on the different lines across the river in June, 1888, before the protective works were commenced; the red lines, the contour on the same lines across the river in June, 1889; and the green lines, the contour in June, 1890.

The soundings of June last show a decided shoaling of the water against the protective works, and a corresponding scouring on the bottom of the river and increase in depth of water on the opposite side; and, so far as can be ascertained, the works are accomplishing in a highly satisfactory manner the results anticipated at the commencement of the work.

The work done the past season has been confined principally to completing and securing the work at the head of Front Street, where left in an unfinished condition at the close of operations in 1889, consequent upon the usual fall freshets. Mats and riprap work have also been laid in places on the bank of the river for a distance of 400 feet below Front Street, where there were indications of scouring and weakness in the banks.

Judging from all present appearances, and from the general conduct of the river against these works, the town of Hadley is effectually protected from further encroachments of the river on its lands within the limits of these works.

The total cost of the work done and material furnished the past season is \$613.04, including the cost of setting willows and other work done in the spring. All bills incurred in the prosecution of the work have been paid, and all claims presented by parties for damage to crops, brush taken, etc., have been satisfactorily adjusted and paid, with the exception of that of Mr. Thaddeus Graves of Hatfield, for a small lot of brush taken in 1889, of which mention was made in my report for that year.

Respectfully submitted,

E. C. DAVIS,

NORTHAMPTON, MASS., December 20, 1890.

Superintendent.

The whole amount which has been appropriated for the protective work at Hadley, is \$30,000. The total cost has been \$29,581.55, leaving a balance of \$418.45 uncalled for in the treasury.

River Banks at West Springfield.

In September last, the board was petitioned by the selectmen of West Springfield to investigate the condition of the banks of the river in that town, which, it was alleged, were wearing away and caving in, and thus undermining a dike which had been built along the bank for the protection of the public highways of the town, and the private property of a large number of its inhabitants, in times of freshet.

The locality was visited in October, and such examinations were made by the engineer of the board and his assistant as the high stage of the water at that season of the year would permit. It was found that the bank was caving and receding in several places on the West Springfield shore, and at some points quite rapidly. The greatest wearing was in the vicinity of the Boston and Albany railroad bridge; and, about 70 feet below the bridge, it had reached to within 8 to 12 feet of the foot of the slope of the dike.

It was also found that at various places on the opposite bank, in the city of Springfield, retaining walls and other structures had been built by the railroad companies and others below the high-water line, and that, in some places, the dumping of a considerable or large amount of ashes, cinders and other material, outside or beyond the line of the walls, was going on. These encroachments tend to direct the force of the current against the West Springfield bank, and, by narrowing the width of the river channel, to increase the height of the water in times of freshet; and they are likely to be especially injurious when made on that section of the river opposite the dike.

This dike appears to have been built under the direction of the county commissioners, pursuant to the provisions of chapter 80 of the acts of 1868, the cost being apportioned to the town and the several owners of land benefited. It is to be maintained, repaired or rebuilt by the town, the expense to be divided in like proportions by the selectmen, as provided in chapter 389 of the acts of 1869.

For the distance of about 100 feet immediately below the

railroad bridge, the dike was most in need of immediate repair. A temporary bulkhead had been built by the town authorities, which would probably be of little use unless backed by earth and rubble. But there appears to be ample statute provision for the maintenance of the dike, and the emergency and cost do not at present seem to be beyond the reasonable ability of those most directly concerned to provide for.

But the unauthorized and injurious encroachments on the Springfield side of the river ought not to continue. If these are prevented, expedients may be adopted to arrest the wearing of the opposite bank now going on. It is the intention of the board to make further investigations when the season of low water in the river arrives.

LEASE OF HANGMAN'S ISLAND.

All lands and waters within the territorial limits of the Commonwealth, to which no individual or body corporate shows or can show title, are the property of the Commonwealth. It is to be presumed in such cases either that the State and its predecessors, the Colony and Province, have never granted the original title derived from the crown of England, or else that the title has reverted in the State by escheat or otherwise.

The State not only has jurisdiction or dominion, as the sovereign power, over such lands and waters, but is the owner of the fee, and may convey or lease them as proprietor.

Outside of the public domain in tide waters and great ponds, and the Province lands in the town of Provincetown, it is not known or supposed that there are any considerable tracts of territory to which the State holds title as above. There are, however, parcels of such land. Quite a number, in the form of islands in tide waters and great ponds, have come to the knowledge of the board during the last few years; and leases of some of them have been given in the name of the Commonwealth.

The board is authorized, with the approval of the governor and council, to lease public lands for periods not

exceeding five years. Such a lease (see Appendix, D) has been given the last year of Hangman's Island in Boston harbor.

This island, less than an acre in extent, is within the tide-water limits of the city of Quincy; but neither that city nor any other municipality or person has shown or claimed the ownership of it. The island has been occupied for some years by a small colony of industrious and thrifty fishermen, who desired to acquire a legal right of possession and improvement, and to have the power to exclude persons making it a place of irregular resort. The lease has been given to a trustee for their common use and benefit.

The foregoing Report is respectfully submitted.

JOHN E. SANFORD.
JOHN I. BAKER.
CHARLES H. HOWLAND.

Boston, January 1, 1891.



APPENDIX.



APPENDIX.

[A.]

[See page 13 of this Report, *ante*.]

ESTABLISHMENT OF HARBOR LINES IN BOSTON HARBOR, AS RECOMMENDED BY THE HARBOR LINE BOARD AND APPROVED BY THE SECRETARY OF WAR, DURING THE YEAR 1890.*

I. CHARLES RIVER.

Left Bank of Charles River from Grand Junction Railroad Bridge to the Navy-Yard — Pier and Bulkhead Lines.

The State of Massachusetts has never fixed bulkhead as distinguished from pier-head lines. The Board has deemed it best to do so, and the accompanying maps sufficiently indicate the proposed location of the bulkhead lines, beyond which it is understood that no solid constructions shall hereafter be extended.

On the left bank of the Charles River basin, between Grand Junction Railroad bridge and Craigie's bridge, the pier and bulkhead line has been drawn to coincide with the line established by the State legislature.

The tidal prism of the Charles River basin has already been unadvisedly reduced, and this line contemplates a still further reduction; moreover, the forest of piles driven in the water-way below interferes with the current at the mouth of the river. A comparison of the survey of 1888 with that of 1861 shows a shoaling below the bridges of 712,415 cubic yards, reducing the average depth by 3.66 feet over an area of more than 120 acres.

Several Boards and all the officers of the Corps of Engineers, who for many years have discussed and reported upon this subject, have insisted upon the preservation of the Charles River

* The following explanations and descriptions of the several Harbor Lines as approved by the Secretary of War, are taken from the Reports of the Harbor Line Board recommending their adoption.

basin as a tidal reservoir for the maintenance of the channels of the harbor. But heretofore the General Government has never exercised the right to control and direct this matter, although the fact of these encroachments has been officially placed on record. Meanwhile the State of Massachusetts has authorized the filling up of this basin to the line above mentioned without a corresponding enlargement of the tidal prism in other places, and has granted privileges involving a great outlay of capital. To move the pier and bulkhead line back as would be desirable for the "protection and preservation of the harbor," would therefore interfere with vested rights of great value. In granting these privileges the State of Massachusetts has virtually assumed the responsibility for any injury to the harbor that has accrued or may accrue from this cause, and the Board therefore recommends for the approval of the Secretary of War the lines above indicated.

From Craigie's bridge to the navy-yard at Charlestown, the Board has deemed it expedient for the "preservation and protection of the harbor" to establish a bulkhead line, as well as a pier-head line. These two lines coincide as far as Warren bridge, and up to the Eastern Railroad bridge conform to the existing harbor line enacted by State law. Beyond the Eastern Railroad bridge the State harbor line is abandoned, and the new lines, located coincidentally, assume a new direction, closer to the original shore line, as far as Warren bridge. Eastward of Warren bridge the pier-head line coincides with the State harbor line as far as the navy-yard, while the bulkhead line follows a nearly parallel course to the northward, at a distance of 600 feet, approximately. The State line and the proposed lines are delineated upon accompanying charts.

The harbor lines which are recommended for adoption are defined as follows:—

Beginning at a point on the northerly side of West Boston Bridge at its intersection with the face of the wharf, and marked by a copper tack through an iron plate on the cap outside of the brick sidewalk, and indicated on the plan by the letter A; thence running southwesterly on a curve of 951.34 feet radius (tangent to a line to be hereafter described running between West Boston and Craigie's bridges) for a distance of 503.01 feet; thence continuing southwesterly on a straight line tangent to said curve for a distance of 6,838.19 feet; thence westerly on a curve of 1,200 feet radius tangent to the last named line, for a distance of 496.97 feet; thence westerly on a straight line tangent to the last named curve to the Grand Junction Railroad Bridge. Again beginning at the point on the northerly side of West Boston Bridge marked A (previously described); thence northeasterly to point B, which is on the southerly side of Craigie's Bridge at its intersection with the face of the wharf,

and is marked by a copper tack through an iron plate on the cap outside of the sidewalk, and is referred to point B' which is at the southeasterly corner of the Boston and Lowell machine-shop; distance from B to B', 73.39 feet; bearing from B to B', $221^{\circ} 46' 19''$; thence northeasterly to point C at the southerly side of the Boston and Lowell Railroad passenger bridge at its intersection with the face of the wharf, and marked on the cap-sill of the bridge by a copper tack through an iron plate; thence the line continues northeastwardly to the point C'.

The point C' is 58 feet southerly (measuring along the face of the solid bulkhead) from the intersection of the line B C (just described) prolonged to an intersection with the solid bulkhead of the Fitchburg Railroad Bridge; C' is 853 feet approximately northeasterly from C.

From C' the line follows the faces of the solid bulkhead of the Fitchburg Railroad in an easterly direction to the point D', which is at the intersection of said solid bulkhead with the westerly side of Warren Bridge.

At the point D' the pier and bulkhead lines separate. The pier-head line lies in the west face of Warren Bridge to the point D, which is about 66 feet southerly from the outer face of the wharf on the same westerly side of Warren Bridge, and is marked by a copper tack through an iron plate; thence the pier-head line extends to the point E, which is at the easterly side of Charles River Bridge, about 80 feet southerly from the outer face of Tudor's Wharf on the same easterly side of said Charles River Bridge, and is marked by a copper tack through an iron plate; thence northeasterly to the point F, which is about 80 feet southeasterly from the southwesterly corner of Hittinger's Wharf, and nearly in the alignment of the westerly side of said Hittinger's Wharf produced, and is referred to point E; distance from point F to point E, 379 feet; bearing from point F to point E is $59^{\circ} 6' 27''$; thence northeasterly to point G, which is at the southwesterly corner of the navy-yard shears wharf, and is referred to point G', which is near the same southwesterly corner of the said navy-yard shears wharf, and is marked by a copper tack through an iron plate; distance from G to G', 1.40 feet; bearing from G to G', $150^{\circ} 35'$.

From the point D' the bulkhead line runs northeasterly in a straight line (parallel to the pier-head line F G) 1,470 feet approximately to an intersection with the boundary wall of the navy-yard.

[Approved by the Secretary of War, February 13, 1890.]

Charles River from near Brookline Street Bridge to Market Street Bridge.

The State of Massachusetts has never established lines upon this portion of the river, but the Board has deemed it necessary to do so. The lines recommended are indicated upon the chart and described as follows:

The line on the north side of Charles River begins at the Grand Junction Railroad Bridge, at the intersection of the east side of the

bridge and the harbor line approved by the Secretary of War, February 13, 1890; thence in a straight line, making an angle with the harbor line above referred to of $166^{\circ} 20'$, measuring from a northeasterly to a northwesterly direction, 1,020 feet approximately to the point B, which is situated on a line parallel to and 600 feet north of the northeastern rail of the main line of the Boston and Albany Railroad; thence parallel to said rail 675 feet to the point C; thence to the point D by the arc of a circle of 860 feet radius, tangent to the line last described, said arc subtending an angle at the center of $64^{\circ} 45'$, measuring from a southwesterly to a westerly direction; thence, on a tangent to the last described circle, 850 feet to the point E; said tangent on the line D E, if produced, will intersect the east side of River Street Bridge produced 155 feet northeastward from the face of the easterly stone abutment of said bridge; thence to the point F at the southeast corner of said abutment; thence, following the face of said abutment and the faces of the stone wharf of the Riverside Press Company, to the point G at the northwest corner of said stone wharf; thence to the point H, which is at the northwest corner of the solid abutment of Western Avenue Bridge on the Cambridge side; thence to the point I, which is in the line of the south side of the first street north of Sands street (Cambridge) extended westerly 320 feet from the west side of Banks street; thence to the point J, which is 400 feet from the west side of Banks street, measuring westerly along the south side of the second street north of Sands street; thence to the point K, which is at the southeast corner of the wharf at the foot of Otter street; thence to the northwest corner of said wharf; thence to the southeast corner of Wellington's Wharf; thence to the southwest corner of said wharf; thence to the west corner of College Wharf; thence to the east corner of the solid abutment of the Brighton Street Bridge on the Cambridge side; thence to the point L, which is in the line of the west side of that part of Murray street which runs southwesterly, extended southwesterly 760 feet from the south side of Lyman street; thence to the point M, which is in the line of the north side of that part of Murray street which runs southeasterly, extended northwesterly 830 feet from the west side of Brighton street; thence to the southeast corner of the Cambridge Gas Company's Wharf; thence to the point N, which is in the line of the east side of Willard street extended southerly 180 feet from the north side of Mount Auburn street; thence to the point O, which is 115 feet from the north side of Mount Auburn street, measuring at right angles therewith from a point 155 feet west of the west corner of Willard street; thence parallel to Mount Auburn street 315 feet to the point P; thence to the southeast corner of the Monument Wharf, marked Q on the tracing.

The line on the south side of Charles River begins at the northeast corner of the solid part of Abbot's Wharf, near Brookline Street Bridge, and at the end of the harbor line approved by the Secretary of War July 27, 1889; thence in a straight line 980 feet to the point B', which is 120 feet distant from the northerly rail of the Boston and Albany main track; thence parallel to said rail 830 feet to the point C'; thence to the point D' by the arc of a circle of 1,200 feet radius tangent to the line

last described, said arc subtending an angle of $66^{\circ} 12'$ at the center, measuring from a southwesterly to a westerly direction; thence, tangent to the circle last described, 915 feet to the point E'; said tangent if produced will intersect the east side of River Street Bridge 65 feet, more or less, northeast from the solid abutment of the bridge on the Boston side; thence to the point F' at the north corner of the solid abutment of Western Avenue Bridge on the Boston side; thence, parallel to the line HI on the opposite side of the river, 500 feet to the point G'; thence to the point H', which is 315 feet distant from the opposite point J, measuring on a line at right angles to the line IJ at J; thence to the point I', which is 280 feet distant from the opposite point K, measuring on a line perpendicular to the face of the wharf at K; thence to the point J', which is 300 feet from the northwest corner of the opposite wharf, measuring perpendicular to the face of the wharf at said corner; thence to the point K', which is 300 feet from the east corner of Wellington's Wharf, measuring on a line perpendicular to the face of said wharf at said corner; thence to the point L', which is 320 feet from the west corner of College Wharf, measuring on a line perpendicular at said corner to the line joining said corner with the west corner of Wellington's Wharf; thence to the east corner of the solid wharf east of Brighton Street Bridge; thence along the faces of said stone wharf to the abutment of the Brighton Street Bridge and the face of the stone wharf west of said bridge, and continuing in said line 280 feet from west side of bridge to a point marked M'; the line last described makes an angle of $76^{\circ} 26'$ approximately with the west side of Brighton Street Bridge, measuring from a southwesterly to a westerly direction; thence to the point N', which is 340 feet from the opposite point L, measuring on a line bisecting the angle at L; thence to the point O', which is 340 feet from the opposite point M, measuring on a line perpendicular to the line joining the point M with the southeast corner of the gas wharf; thence to the point P', which is 240 feet from the southeast corner of said wharf, measuring on a line perpendicular to the face of said wharf at this corner; thence to the point Q', which is in the east line of Willard street extended southward 420 feet from the north side of Mount Auburn street; thence to the point R', which is 320 feet from the north side of Mount Auburn Street, measuring on a line perpendicular thereto through the opposite point O; thence to the point S', which is distant 210 feet from the opposite point P, measuring on a line bisecting the angle at P; thence to the point T', which is 200 feet distant from the east corner of Monument wharf, marked Q on tracing, measuring on a line perpendicular to the line joining said corner with the point P.

Above the points Q and T' the lines follow the meanderings of the river as laid down on the map. They are parallel and 200 feet apart to the northwestern corner of Cassidy's Wharf near Arsenal Street Bridge; thence they gradually narrow to 140 feet at the bridge, and preserve this width to Market Street Bridge.

[Approved March 17, 1890.]

II. MYSTIC RIVER.

FROM THE MOUTH OF THE RIVER TO MEDFORD STREET BRIDGE.

South side of South Channel of Mystic River — Pier and Bulkhead Lines.

The pier and bulkhead lines are coincident, beginning at the northwesterly corner of the sea-wall of the United States navy-yard, and run westerly in a straight line to the present northwesterly corner of Holmes' Wharf; thence continue westerly in a straight line to the present northeasterly corner of Stone's Wharf; thence continue westerly, following and coinciding with the northerly face of said Stone's Wharf, and continue in the same direction to the present northeasterly corner of Clark & Smith's Wharf; thence continue westerly in a straight line to a point in the northeasterly line of Elm street produced northerly at the westerly end of said South Channel, and distant 150 feet southerly from the northwesterly corner of said channel as said channel is defined in chapter 481 of the acts of the general court of Massachusetts of the year 1855. This line coincides with the line established by the State in chapter 302, acts of 1874.

South side of Mystic River — Pier and Bulkhead Lines.

Beginning at the point where the southeasterly line of Johnson's Wharf extended to the North Channel intersects a line drawn from the northeasterly corner of Tuft's mill-pond to a point on Chelsea Bridge 700 feet northerly from the northerly side of the south draw in said bridge, the line runs easterly 820 feet by an arc of a circle curving northerly, and having a radius of 3,500 feet; thence continues easterly by a straight line tangent to said arc, and in such a direction that it shall pass through a point on the northwesterly side of said bridge 770 feet southerly of the southerly side of the north draw in said bridge, running by said straight line to a point 341 feet westerly of the westerly side of said bridge; thence running southeasterly by an arc of a circle turning southerly, and having a radius of 675 feet, said arc to be continued until a straight line drawn tangent to said arc would, if continued, pass through the northeasterly corner of the timber dock of the navy yard of the United States, said line tangent to be continued to the northerly side of the South Channel to a point 500 feet distant from said corner of said dock, and 817 feet distant from the easterly side of Chelsea Bridge by a line drawn at right angles with said bridge; thence running westerly by a straight line which extended would strike the line of the northeasterly side of Elm street produced 500 feet from the northerly side of Medford street, measured on said northeasterly side of Elm street, to a point 320 feet easterly from said northeasterly side of Elm street produced; thence running southwesterly by an arc of a circle

turning southerly, and having a radius of 600 feet, to a point on said easterly line of Elm street extended northerly 375 feet from the northerly side of Medford street. This line coincides with the line established by the State in chapter 481, acts of 1855, and chapter 150, acts of 1867.

The portion of the line thus described between its point of beginning and where it first intersects the easterly line of Elm street produced northerly to the channel, and a straight line drawn from this point of beginning to the northeasterly corner of Tuft's mill-pond, is to be considered a pier-head line beyond which no pile structure shall be extended; and the remainder of the line above described is to be considered a bulkhead line beyond which solid filling shall not hereafter be permitted.

Beginning again at the point where the line above described first intersects the northeasterly line of Elm street produced northerly to the channel, the bulkhead line follows the line of the northeasterly line of Elm street produced northerly, in a southerly direction to a point 600 feet distant from the pier-head line measured on a line at right angles thereto; thence runs westerly, in a line parallel to and 600 feet inside of the pier-head line, to the easterly face of the wall bounding Tuft's mill-pond on the east; thence along the face of this wall to the northeasterly corner thereof; thence the pier and bulkhead lines are coincident, and follow the channel-face of Tuft's mill-pond wall to the southerly abutment of the Malden Bridge; thence along this solid abutment and its northeasterly face to the north corner thereof; thence in a straight line which, if produced, will strike the easterly corner of the solid filling of the Boston and Maine Railroad Company's coal dock above the Eastern Railroad bridge, to the easterly face of the Eastern Railroad bridge; thence along the easterly face of this bridge to a point distant 375 feet northeasterly from the northeasterly corner of the solid abutment of said last-named bridge on the southerly side of the channel; thence the pier-head line runs northwesterly to a point on the easterly side of the bridge of the Boston and Maine Railroad, distant 625 feet northerly from the northeasterly corner of the solid abutment of said last-named bridge on the southerly side of the channel; and the bulkhead line between the Eastern Railroad Bridge and the Boston and Maine Railroad Bridge is parallel to and 30 feet within said pier-head line.

The pier-head line so described between the Eastern and Boston and Maine Railroad bridges coincides with the line established by the State in chapter 231 of the acts of 1873.

The line of the channel wall of Tuft's mill-pond was established as a harbor line by chapter 293 of the acts of 1856. Between the southeasterly line of Johnson's Wharf prolonged and Tuft's mill-pond, and between the Malden and Eastern Railroad bridges, the State has established no harbor line.

Beginning again at the point of intersection of the bulkhead lines of the northerly side of the South Channel and Main Channel, said point being 500 feet in a northerly direction from the east corner of the timber dock of the United States navy-yard, the pier-head line coincides with

the bulkhead line of the Main Channel for a distance of 605 feet; thence runs northerly in a straight line to a point which is distant 385 feet easterly from the easterly side line of said avenue, measuring at right angles to said avenue from a point in the said easterly side line, which latter point is distant 100 feet southerly from the top face of the northerly abutment of said avenue, measuring said latter distance on said easterly side line; thence turning and running northwesterly in a straight line to a point in the easterly side line of said avenue extended northerly, which point is distant 65 feet northerly from the top face of the abutment aforesaid, measuring on said easterly side line so extended. Then beginning again at a point in the westerly side line of said avenue extended northerly, which point is distant 65 feet northerly from the top face of the abutment aforesaid, measuring on said westerly side line so extended; thence running westerly in a straight line to a point which is distant 30 feet northerly from the northwesterly angle of the sea-wall of said corporation as now built; thence turning a little and running still westerly in a straight line parallel to and 30 feet distant northerly from the top face of the northerly sea-wall of said corporation as the same is now authorized to be built, until the said straight line intersects the easterly side line of Elm street extended northeasterly; thence southerly along said line of Elm street to the bulkhead line.

Said pier-head line coincides with the line established by the State in chapter 272 of the acts of 1885.

The pier-head line on the north side of the South Channel is parallel to the bulkhead line and 35 feet outside of it, as established by the State in chapter 19 of the acts of 1859.

Chelsea Side of Mystic River and Chelsea Creek between Chelsea Bridge and Meridian Street Bridge—Pier and Bulkhead Lines.

The pier-head line coincides with the line established by the State in chapter 344 of the acts of 1887, and is as follows: Beginning at a point on the southeasterly side of Chelsea Bridge at the southeasterly corner of the solid portion of said bridge, as now built, at the Chelsea end thereof; thence running southeasterly down Mystic River, making an angle of $73^{\circ} 6'$ taken from a southwesterly to a southeasterly direction with the southerly side of said bridge, and passing through the southwesterly corner of Black's Wharf, 697.57 feet to a point at or near the angle of junction of Chelsea Creek with Mystic River; thence turning $78^{\circ} 58' 11''$ to the east and north and running northeasterly up Chelsea Creek, passing through the southeasterly corners of Gerrish's Wharf and Bisbee's Wharf, 1,496.03 feet to a point on the westerly side of Meridian Street Bridge, marked by an iron plate and copper tack, and distant 23.3 feet southerly from the abutment of said bridge at the Chelsea end thereof.

The bulkhead line is parallel to and 300 feet within the pier-head line.

North side of Mystic River between Chelsea Bridge and Boston and Maine Railroad Bridge — Pier and Bulkhead Lines.

Beginning at a point where a line drawn on the north side of the channel, parallel to and 1,200 feet distant from the bulkhead line on the south side of the channel, intersects the westerly line of the north abutment of Chelsea Bridge, marked M on Boston Harbor Line Board Sheet "J," the pier-head line runs westerly in said parallel line 2,000 feet to a point marked N. Beginning again at a point marked O in said parallel line, at the point of its intersection with the easterly line of Elm street produced across the river, and running westerly in said parallel line 2,475 feet to a point marked P; thence in the arc of a circle curving west and north, and tangent to said line at said point P, with a radius of 1,600 feet, to its intersection with the westerly line of the Malden Bridge abutment; thence northwesterly in a straight line to a point at the mouth of the Malden River marked Q, said point being 710 feet from the easterly side of the Boston and Maine Railroad Bridge, measuring at right angles thereto from a point 570 feet northerly of the south end of the north abutment of said bridge.

The bulkhead line is coincident with the pier-head line between the points M and N. Between Island End and Malden Rivers, the bulkhead line is 600 feet within and parallel to the pier-head line, terminating in Island End River in the northeasterly line of Elm street produced northerly, and in Malden River in the line hereafter described for the left bank of that river.

The harbor lines upon the north side of the river established by the State in chapter 293 of the acts of 1856, and chapter 302 of the acts of 1874, are indicated upon sheet J.

South Side of Mystic River above Boston and Maine Railroad Bridge — Pier and Bulkhead Lines.

Beginning at the northeast corner of the south abutment of the Boston and Maine Railroad Bridge, the bulkhead and pier-head lines are coincident, and follow the north face of said abutment to the west corner thereof; thence run southerly along the westerly face of the said abutment a distance of 700 feet; thence continue northwesterly 1,200 feet on a line which if prolonged would pass through the northeasterly corner of the south abutment of the Middlesex Avenue Bridge; thence, turning westerly through an angle of 135° measured from a southeasterly to a southwesterly direction, continue in a straight line for a distance of 300 feet; thence turning northwesterly continue in a straight line to the northeasterly corner of the south abutment of Middlesex Avenue Bridge; thence along the northerly face of said abutment to the northwest corner thereof; thence, by an angle of 62° with the west face of Middlesex Avenue Bridge, continue northwesterly in a straight line for a distance of 525 feet; thence, by the arc of a circle with a radius of 510 feet tangent thereto, measuring about $64^{\circ} 30'$ from an easterly to

a westerly direction, and by a tangent which extended would strike the southerly line of Mystic avenue at a point 1,420 feet westerly of the southwest corner of Mystic avenue and Taylor street, to a point 250 feet northeasterly from the south side of Mystic avenue, measured along said tangent; thence northwesterly, by a straight line making an angle of 40° with said tangent, to the line of the northerly side of Mystic avenue at a point marked X.

*North side of Mystic River above Boston and Maine Railroad Bridge
— Pier and Bulkhead Lines.*

Beginning at the easterly corner of the north abutment of the Boston and Maine Railroad Bridge, the bulkhead and pier-head lines are coincident, and follow the southerly face of said abutment to the southwest corner thereof; thence the westerly face of the said abutment for a distance of 400 feet; thence northwesterly, by a straight line making an angle of 40° with said line and said abutment, a distance of 450 feet; thence northwesterly, by a straight line which prolonged would strike the easterly side of Middlesex Avenue Bridge at a point 290 feet northerly of the end of the draw opening on the north side, a distance of 1,000 feet; thence northwesterly to a point in the westerly side of Middlesex Avenue Bridge 425 feet distant from the southwesterly end of the draw opening in the north side; thence turning westerly and southerly by the arc of a circle of 1,915 feet radius (the center of said circle being in the west face of Middlesex Avenue Bridge prolonged) through about 45° ; thence southwesterly, by a tangent to said arc which prolonged would strike the southerly side of Mystic Avenue prolonged at a point 1,725 feet westerly of the southwest corner of Mystic avenue and Taylor street, to a point 560 feet from its intersection with the south side of Mystic avenue measured in said tangent; thence, by the arc of a circle turning from a southeasterly to a southwesterly direction and tangent to said last tangent line with a radius of 340 feet, to a line tangent thereto and 275 feet distant from and parallel to Mystic avenue at a point marked Y.

Above the points X and Y the lines are coincident, and follow the meanderings of the river, with a variable distance apart as indicated upon Harbor Line Board Sheet L, to the Medford Street Bridge in the town of Medford.

The State has established no lines on the river above the Boston and Maine Railroad Bridge.

[Approved June 20, 1890.]

III. MALDEN RIVER.

From the Mouth of the River to the Dam in Malden—Pier and Bulkhead Lines.

Beginning at the point Q in the pier-head line on the north side of Mystic River, the pier-head line runs in the arc of a circle of a radius of 600 feet through 69° , turning in a northerly direction; thence by a tangent to this arc to an intersection with the bulkhead line on the north side of Mystic River prolonged northwesterly, which point is marked R.

Beginning again at the southeasterly corner of the north abutment of the Boston and Maine Railroad Bridge, the pier and bulkhead lines are coincident, and follow the easterly side of said bridge abutment a distance of 570 feet; thence in a straight line to a point easterly of and 170 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,010 feet north of the south end of the north abutment of said railroad company's bridge; thence runs more easterly in a straight line to a point 460 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,355 feet north of the south end of the north abutment of said railroad company's bridge; thence runs still more easterly to a point 815 feet distant from the easterly rail of the Boston and Maine Railroad, measured at right angles thereto from a point on said rail 1,615 feet north of the south end of the north abutment of said railroad company's bridge, which point is marked S.

The distance between the points R and S is about 400 feet. Above these points the bulkhead lines follow the meanderings of the river, and converge gradually to a distance apart of 150 feet opposite the switch of the Medford branch of the Boston and Maine Railroad; thence, in a distance of about 600 feet, they approach to 100 feet of each other and preserve this distance apart of 100 feet to a point about 200 feet below the second bridge near the rubber works; thence they converge to a distance apart of 50 feet at said bridge.

Above the points R and S, pile structures may be authorized to extend beyond the bulkhead lines to the line of mean low water.

The State has established no lines for this river.

[Approved June 20, 1890.]

IV. ISLAND END RIVER.

Pier and Bulkhead Lines.

Beginning at the point O in the pier-head line on the north side of Mystic River, the bulkhead line runs northerly in the line of the easterly side of Elm street produced across the Mystic River to its intersection with the bulkhead line at the point marked X on the north side of Mystic River; thence turning easterly by an angle of 10° , measured from a northeasterly to an easterly direction from the line of Elm street produced, it continues straight till it intersects the line of the northeasterly side of Beachem street produced southeasterly at the point marked Y; thence in a straight line to the point marked Z, which point is 500 feet distant from the northwesterly face of the powder magazine on the opposite side of the river, measured in the line of the northeasterly side of the powder magazine wharf.

Beginning again at the point X in the harbor line on the north side of Mystic River, the bulkhead line runs northwesterly at an angle of 125° with the line M N, measured in a northerly and westerly direction, a distance of about 430 feet; thence turning at an angle of 119° , measured from a southeasterly to a northeasterly direction, it continues northeasterly about 625 feet till it intersects a line drawn parallel to the line Y Z on the opposite side of the river, from a point in the northerly side of the powder magazine wharf 100 feet distant from the westerly face of the powder magazine.

Above the powder magazine wharf, the bulkhead lines follow the meanderings of the river, gradually converging to a distance apart of 300 feet just below the fork of the river; thence the lines preserve a distance apart of 200 feet in the main river up to the solid dike, and in the branch a distance apart of 100 feet up to the mill-dam.

The lines thus described are bulkhead lines between which no solid filling shall be hereafter permitted, but pile wharves may be authorized to extend to the mean low water line.

The State has established no lines for this river.

[Approved June 20, 1890.]

V. CHELSEA CREEK.

East Boston side of Chelsea Creek between Meridian Street Bridge and Chelsea Street Bridge—Pier and Bulkhead Lines.

Beginning at the point A of the pier-head line in the westerly face of Meridian Street Bridge, adopted by the Secretary of War July 27, 1889, the pier-head line runs southeasterly to a point 945 feet northerly of Condor street, measured on a line at right angles thereto from a point in the northerly line of said street 840 feet east of its intersection with the easterly line of Meridian street; thence continues southeasterly to the northwest corner of the Glendon Rolling Mills Wharf; thence southeasterly along the face of said wharf to the northeast corner thereof; thence easterly about 460 feet to a point marked H situated 814 feet from the northerly side of Eagle street, measuring northerly and at right angles thereto from a point in said side of said street 460 feet westerly from the intersection therewith of the westerly side of Chelsea street; thence northeasterly about 415 feet to a point marked I situate 685 feet from the westerly side of Chelsea street, measuring northwesterly and at right angles thereto from a point in said side of said street 685 feet northerly from the intersection therewith of the northerly side of Eagle street; thence northeasterly again about 1,915 feet to a point marked K on the west side of Chelsea Street Bridge, said point being 158 feet northerly from the face of the south abutment of said bridge.

This line varies slightly from the line established by the State in chapter 204, acts of 1849, and delineated upon the chart.

The bulkhead line commences at the termination of the bulkhead line in the west face of Meridian Street Bridge, adopted by the Secretary of War, July 27, 1889, and runs northerly to a point in the west face of said Meridian Street Bridge distant 515 feet from the north side of Condor street; thence easterly to a point 500 feet northerly of Condor street, measured on a line at right angles thereto from a point in the northerly line of said street 840 feet east of its intersection with the easterly line of Meridian street; thence continues southeasterly to the intersection of the northerly line of Condor street with the easterly line of Knox street; thence easterly in the line of the northerly side of Condor street produced easterly about 1,038 feet to the westerly face of the East Boston Gas Company's solid wharf; thence northeasterly about 640 feet to a point 275 feet northwesterly of the northwesterly side of Chelsea street, measured on a line at right angles thereto from a point 830 feet northeasterly from the intersection of said side of said street with the northerly side of Eagle street; thence northeasterly about 820 feet to a point 120 feet southeasterly from the face of the south abutment of the Chelsea Street Bridge, measured in the line of the southwesterly face of the bridge; thence to the point K in the pier-head line.

Chelsea side of Chelsea Creek between Meridian Street Bridge and Chelsea Street Bridge — Pier and Bulkhead Lines.

The pier-head line coincides with the line established by the State in chapter 204 of the acts of 1849, with a slight variation near its termination in Meridian Street Bridge, and is as follows:

Commencing at a point on the west side of Chelsea Street Bridge, situated 202 feet southerly from the intersection of the same with the southerly line of Marginal street in the city of Chelsea, said point being marked L on the plan; thence running southwesterly about 955 feet to a point marked M, situate 306 feet from the south line of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 15 feet easterly from the first bend therein west of Chelsea Street Bridge aforesaid; thence again southwesterly about 317 feet to a point marked N, situate 394 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 60 feet westerly from the afore-mentioned bend therein; thence westerly about 386 feet to a point marked O, situate 455 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto from a point in said side of said street 440 feet westerly from the afore-mentioned bend therein; thence again westerly about 210 feet to a point marked P, being the southwesterly corner of the Glendon Rolling Mills Company's pier on the Chelsea Flats, situate in the division line of the Winnisimmet Company's water lots numbered 21 and 22, and 465 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 1,330 feet to a point marked Q, situate in the division line between Austin and Carruth's wharves, and 248 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 740 feet to a point marked R, situate in the line of the southerly side of Hawes' Wharf continued, and 300 feet from the southerly side of Marginal street, measuring southerly and at right angles thereto; thence again westerly about 640 feet to a point in the westerly side of Meridian Street Bridge marked by an iron plate and copper tack, and distant 23.3 feet southerly from the abutment of said bridge at the Chelsea end thereof.

The bulkhead line is in rear of the pier-head line, and follows the southeasterly side of Marginal street from Chelsea street to the corner of Pearl and Williams streets.

Chelsea side of Chelsea Creek above Chelsea Street Bridge — Pier and Bulkhead Lines.

Beginning at a point in the easterly side of Eastern avenue, at its intersection with the stone wharf on the southerly side of Bass Creek, the pier-head line follows the northerly face of said stone wharf and its

prolongation easterly for a distance of 560 feet; thence by an arc of a circle of 400 feet radius turning easterly and southerly, and by a tangent to said arc, to the point L of the pier-head line in the westerly face of Chelsea Street Bridge, previously described.

Beginning again at the point in the easterly side of Eastern avenue, above described, the pier-head line follows the easterly side of said avenue northerly a distance of 80 feet; thence turns easterly and runs parallel to the line on the southerly side of Bass Creek till it intersects with the westerly side of Marginal street; thence turning easterly and northerly by the arc of a circle of 530 feet radius and a tangent thereto to a point in the south side of Willoughby street extended easterly 530 feet from the southwest corner of Willoughby and Marginal streets; thence to a point in the north side of Dana street extended easterly 800 feet from the east side of Marginal street; thence to a point in the north side of Bancroft street extended easterly 900 feet from the east side of Marginal street; thence to a point in the south side of Louis street extended easterly 1,100 feet from the east side of Marginal street; thence to a point 580 feet southeasterly from the east side of the abutment of the Eastern Railroad Bridge over Chelsea Creek, measuring in a line perpendicular thereto at a point 50 feet southwest from the northeast corner of said abutment; thence by the arc of a circle of 200 feet radius turning northerly and westerly through an angle of about 141° ; thence in a tangent to said circle to the point 50 feet southwest of the abutment above referred to; thence to the northeast corner of said abutment; thence along the face of the abutment to the northwest corner; thence in a straight line, making an angle of 65° degrees with the western face of said abutment, to the dam of Slade's tide-mill.

Bulkhead Line.—Beginning at the intersection of the south side of Marginal street with the west side of Chelsea Street Bridge, the line follows the southerly side of said Marginal street and its prolongation northeasterly to the easterly side of the Grand Junction Railroad Bridge; thence northeasterly by line parallel to the pier-head line about 970 feet, and by an arc of a circle of 325 feet radius turning westerly to an intersection with the pier-head line on the south side of Bass Creek; thence it is coincident with the pier-head line to and along the easterly side of Eastern avenue and the northerly side of Bass Creek to the west side of Marginal street; thence the bulkhead line turns easterly and northerly by the arc of a circle of 315 feet radius and a tangent thereto to a point in the side of Willoughby street produced easterly, distant 210 feet from the west side of Marginal street; thence by a straight line to the north side of Dana street 470 feet easterly from the east side of Marginal street; thence to a point in the south side of Louis street 615 feet easterly from the east side of Marginal street; thence follows the southerly side of Louis street prolonged to its intersection with the pier-head line; thence the bulkhead line is coincident with the pier-head line to Slade's mill-dam.

Easterly side of Chelsea Creek above Chelsea Street Bridge — Pier and Bulkhead Lines.

Beginning at the point K of the pier-head line in the westerly side of Chelsea Street Bridge, before described, the pier-head and bulkhead lines are coincident, and follow the high-water lines and the westerly side of the railroad embankment and trestle to Slade's mill-dam, as delineated on the chart.

[Approved June 20, 1890.]

VI. SHORE OF EAST BOSTON.

From Jeffrey's Point to Breed's Island — Pier and Bulkhead Lines.

The legal line from the point A near Jeffrey's Point, East Boston, to the point B at Breed's Island, established by section 5, chapter 293, acts of the Commonwealth of Massachusetts of 1856, is recommended for adoption as the pier-head line, beyond which no pile structure shall extend.

Said point A "is in the southwesterly line of Sumner street extended southeastwardly, and 800 feet from the southeasterly line of Jeffrey's street; thence the line runs easterly to a point in the northeasterly line of Everett street continued southeasterly, and distant 1,610 feet from the southeasterly line of Jeffrey's street; thence the line runs northerly to a point in the line of the northeasterly side of Neptune street continued southeastwardly, and distant 1,500 feet from the southeasterly line of Shirley street; thence the line runs straight northeastwardly to the point B on the southwesterly shore of Breed's Island, distant 1,250 feet from the southeasterly line of Saratoga street extended northeastwardly, measuring at right angles therewith from a point distant 1,300 feet from the southwesterly line of Trumbull street."

A parallel line 600 feet in rear thereof is recommended for adoption as the bulkhead line, beyond which no solid filling shall hereafter be permitted.

[Approved June 2, 1890.]

VII. DORCHESTER BAY.

From South Boston to Moon Island.

For Dorchester Bay, between a point C at City Point and a point Y on Neponset River, the pier-head lines coincide with the lines now fixed by the laws of Massachusetts in chapters 293 of the acts of 1856, 351 of the acts of 1872, and 332 of the acts of 1873.

On the right bank of the Neponset, between the Neponset Avenue Bridge and the mouth, the pier-head line recommended follows the line established by the State in its general features, but modified to give a gradual increase of width to the water-way near the mouth, in accordance with the best modern practice in the case of tidal streams.

Between the mouth of the Neponset River and the sewerage outlet on Moon Island, the State has never defined harbor lines. This has been done by the Board, after several public meetings and full consultation with the riparian proprietors, in a manner which it is believed will protect the general interests of the harbor and serve the local needs of the district in question.

The lines which are recommended for adoption are defined as follows:

1. Pier-Head Lines.

The pier-head line commences at a point marked C, which is in the westerly line of P street, South Boston, extended southwardly, and 530 feet from the southerly line of Sixth street; thence southwestwardly again to the point D in the easterly line of M street extended southwardly, and 1,300 feet from the southerly line of Eighth street; thence westwardly, parallel with Eighth street, to the point E in the easterly line of Old Harbor street extended southwardly; thence southwardly 1,400 feet to the point F in the easterly line of Old Harbor street extended southwardly; thence eastwardly, making an angle of 104° (taken from a northerly to an easterly direction) with the line last described, to the point G in the easterly line of M street extended southwardly; thence 3,200 feet to the point H in the easterly line of M street extended southwardly; thence southwestwardly 2,320 feet, making an angle of 124° (taken from a northeastwardly to a southwestwardly direction) with the line last described, to a point marked X'; thence continuing 1,900 feet westwardly a little more southwardly, making an angle of $5^{\circ} 15'$ with the line last described extended, to the point marked I'; thence westwardly in a straight line which, extended, would strike the east side of the embankment of the Old Colony Railroad 515 feet northwardly from the north side of the present

water-way through said embankment, to a point 500 feet eastwardly from the east side of said embankment, marked J²; thence southwardly 590 feet parallel to the east side of said embankment to a point marked K²; thence southeastwardly in a straight line to the point marked L, which is distant 200 feet from the northeasterly corner of Ranstead, Dearborn & Company's Wharf (as built in 1856), measuring at right angles with the northeasterly end of said wharf; thence southwardly to the point M, distant 1,350 feet from the northeasterly rail of the Old Colony Railroad, measuring at right angles therewith from a point distant 4,000 feet northwestwardly from the draw in its bridge over Neponset River; thence southeastwardly to the point N, distant 1,200 feet from said rail, measuring at right angles therewith from a point distant 3,300 feet northwestwardly from said draw; thence southeasterly to the point O, which is distant 1,460 feet from the said rail, measuring at right angles therewith from a point distant 2,670 feet northwestwardly from the said draw; thence southeastwardly again to the point P, distant 1,630 feet from said rail, measuring at right angles therewith from a point distant 2,150 feet northwestwardly from said draw; thence southeastwardly again to the point Q, distant 1,700 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 1,600 feet northwestwardly from said draw; thence southeastwardly again to the point R, distant 1,590 feet northeastwardly from said rail, measuring at right angles therewith from a point 1,090 feet northwestwardly from said draw; thence southeastwardly to the point S, distant 1,340 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 630 feet northwestwardly from said draw; thence southerly to the point T, distant 1,140 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 380 feet northwestwardly from said draw; thence southwestwardly to the point U, distant 850 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 270 feet northwestwardly from said draw; thence southwestwardly again to the point W on the southeastwardly corner of James Jenkins's Wharf, formerly so called; thence southwestwardly again to the point X on the southeasterly corner of W. R. Chamberlin's Wharf, formerly so called; thence continuing southwestwardly, along the southeastwardly ends of said Chamberlin's Wharf and of Edward Preston's Wharf, formerly so called, to the point Y on the eastwardly side of the Neponset Bridge.

On the easterly side of Neponset River, the line begins at the point A' on the easterly side of the Neponset Bridge, and 400 feet southerly from the point Y on the west side of the river; thence in a straight line to the point B' on the northeasterly side of the Old Colony Railroad Bridge, distant 400 feet southeastwardly from the line W X on the opposite side of the river between the points W and X, measuring at right angles from said line; thence northeastwardly, parallel to the line W U on the opposite side of the river, to the point C', distant 400 feet southeastwardly from the point U, measuring at right angles to the line W U; thence northeastwardly again to the point D', distant 450 feet

southeastwardly from the opposite point T, measuring on a line bisecting the angle at said point T; thence northwardly to the point E', distant 450 feet eastwardly from the opposite point S, measuring on a line bisecting the angle at said point S; thence north a little westerly to the point F', distant 450 feet eastwardly from the opposite point R, measuring on a line bisecting the angle at said point R; thence northerly a little more westerly to the point G', distant 500 feet easterly from the opposite point Q, measuring on a line bisecting the angle at said point Q; thence northwesterly to the point H', distant 650 feet northeasterly from the opposite point P, measuring on a line bisecting the angle at said point P; thence northwesterly to the point I', distant 700 feet northeasterly from the opposite point O, measuring on a line bisecting the angle at O; thence northwesterly to the point J', distant 900 feet northeasterly from the opposite point N, measuring on a line bisecting the angle at N; thence northwesterly to the point K', distant 900 feet easterly from the point M, measuring on a line bisecting the angle at M; thence northeasterly to the point L', distant 1,000 feet from the point L on the west side of the river, measuring on a line perpendicular at L to the line L M; thence to the point M', which is in the easterly side of M street, South Boston, prolonged southwardly 3,150 feet from the point H near the west shaft of the sewer tunnel; thence due east to the point N', which is 3,000 feet due west from Squantum Coast Survey Point; thence easterly to the point O', which is 500 feet due north from Squantum Coast Survey Point; thence due east 4,000 feet to the point P'; thence to the north corner of the sewerage outlet at Moon Head.

2. Bulkhead Lines.

The bulkhead line is coincident with the pier-head line from the point C to the point F.

From F it runs southwardly in a straight line to the point I, which is on the line which bisects the angle at G of the pier-head line and 600 feet west of the line G H of the pier-head line; thence, parallel to the pier-head line G H and 600 feet within it, to a point on the line bisecting the angle at H of the pier-head line; thence parallel to the pier-head line H X' for a distance of 1,300 feet; thence turning by an angle of 105° , measuring from an easterly to a northerly direction, and running 2,000 feet; thence turning by an angle of 105° , measuring from a southerly to a westerly direction, and running 600 feet; thence turning by an angle of 86° , measuring from an easterly to a southerly direction, and running 1,965 feet; thence turning an angle of $91^{\circ} 15'$, measuring from a northerly to a westerly direction, and running 1,600 feet to a point marked II, which is at the intersection of two lines, one a line parallel to the pier-head line X' I² and 600 feet within it, and the other parallel to the pier-head line I² J² and 400 feet within it; thence parallel to the line I² J² and 400 feet from it inland, to the easterly side of the Old Colony Railroad embankment; thence along the easterly side of said embankment to a point 160 feet southward of the draw-opening; thence eastwardly, parallel to K² L of the pier-head line, to the point III.

The point III is in the line last described (parallel to $K^2 L$) at its intersection with the north face of the Boston Gas Company's Wharf prolonged 920 feet westerly from the northeastern corner of said wharf; thence the line follows the faces of said wharf to an intersection with the pier-head line $L M$ 250 feet southerly from L ; thence the bulkhead and pier-head lines are coincident to the point IV, which is 1,000 feet southward from the point L ; thence in a straight line parallel to South Street, and 200 feet from the south side of said street, to a point on the eastern side of Commercial Street Bridge; thence along the east side of Commercial Street Bridge 750 feet; thence to the point V, which is distant 900 feet northeastwardly from the northeastern rail of the Old Colony Railroad, measuring at right angles therewith from a point distant 3,300 feet northwestwardly from the draw in the bridge over the Neponset River; thence to the point VI, which is distant 1,350 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 2,150 feet northwestwardly from said draw; thence to a point distant 1,400 feet northeastwardly from said rail, measuring at right angles therewith from a point distant 1,600 feet from said draw; thence to a point distant 1,250 feet northeasterly from said rail, measuring at right angles therewith from a point distant 1,090 feet northwesterly from said draw; thence to the northeast corner of the sea-wall of Stearns' lumber wharf; thence to a point 155 feet northwesterly from the point W of the pier-head line, measuring along the northeastern face of said wharf; thence the bulkhead line is parallel to and 155 feet distant from the pier-head lines, to the city highway bridge over Neponset River.

On the easterly side of Neponset River, the bulkhead line starts at a point on the east side of the highway bridge over Neponset River 750 feet southeast from the point Y , measuring along the east side of said bridge, and runs in a straight line to a point in the east side of the Old Colony Railroad Bridge 350 feet southeastward from the point B' of the pier-head line, measuring along the east side of said bridge; thence to the point VII, which is 350 feet distant from the point C' of the pier-head line, measuring on a perpendicular to the pier-head line $B' C'$ at C' ; thence to the point VIII, which is 350 feet distant from the point D' of the pier-head line, measuring on a perpendicular to the pier-head line $C' D'$ at D' ; thence to the point IX, which is in the pier-head line $B' C'$ extended eastwardly 1,050 feet from C' ; thence to the point X, which is distant 2,420 feet from the northeasterly rail of the Old Colony Railroad, measuring perpendicular thereto from a point 1,090 feet from the draw in the bridge over the Neponset River; thence to the point XI, which is distant 2,775 feet northeasterly from said rail, measuring at right angles therewith from a point distant 3,300 feet from said draw; thence the bulkhead line is parallel to the pier-head line, and 600 feet within it, to the point XII, which is at its intersection with the foot of the outfall sewerage embankment, near point P' of the pier-head line; thence along said foot of the embankment to the north corner of the sewerage outlet, where the bulkhead and pier-head lines meet.

[Approved February 13, 1890.]

[B.]

[See page 14 of this Report, *ante*.]

SECTIONS 4 TO 12 OF THE RIVER AND HARBOR ACT OF SEPTEMBER 19, 1890, RELATING TO BRIDGES AND OTHER OBSTRUCTIONS IN NAVIGABLE WATERS, TO HARBOR LINES, ETC.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, * * * **

SECTION 4. That section nine of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and reenacted so as to read as follows :

That whenever the Secretary of War shall have good reason to believe that any railroad or other bridge now constructed, or which may hereafter be constructed, over any of the navigable water-ways of the United States, is an unreasonable obstruction to the free navigation of such waters on account of insufficient height, width of span, or otherwise, or where there is difficulty in passing the draw-opening or the draw-span of such bridge by rafts, steam boats, or other water-craft, it shall be the duty of the said Secretary, first giving the parties reasonable opportunity to be heard, to give notice to the persons or corporations owning or controlling such bridge so to alter the same as to render navigation through or under it reasonably free, easy, and unobstructed ; and in giving such notice he shall specify the changes required to be made, and shall prescribe in each case a reasonable time in which to make them. If at the end of such time the alteration has not been made, the Secretary of War shall forthwith notify the United States district attorney for the district in which such bridge is situated, to the end that the criminal proceedings mentioned in the succeeding section may be taken.

SECTION 5. That section ten of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and reenacted so as to read as follows :

That if the persons, corporation, or association owning or controlling any railroad or other bridge, shall, after receiving notice to that effect as herein before required from the Secretary of War and within the time prescribed by him, willfully fail or refuse to remove the same, or to comply with the lawful order of the Secretary of War in the premises, such persons, corporation or asso-

ciation shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five thousand dollars; and every month such persons, corporation, or association shall remain in default in respect to the removal or alteration of such bridge shall be deemed a new offense, and subject the persons, corporation, or association so offending to the penalties above prescribed.

SECTION 6. That it shall not be lawful to cast, throw, empty, or unlade, or cause, suffer, or procure to be cast, thrown, emptied, or unladen, either from or out of any ship, vessel, lighter, barge, boat, or other craft, or from the shore, pier, wharf, furnace, manufacturing establishments, or mills of any kind whatever, any ballast, stone, slate, gravel, earth, rubbish, wreck, filth, slabs, edgings, sawdust, slag, cinders, ashes, refuse, or other waste of any kind, into any port, road, roadstead, harbor, haven, navigable river, or navigable waters of the United States, which shall tend to impede or obstruct navigation; or to deposit or place, or cause, suffer, or procure to be deposited or placed, any ballast, stone, slate, gravel, earth, rubbish, wreck, filth, slabs, edgings, sawdust, or other waste, in any place or situation on the bank of any navigable waters where the same shall be liable to be washed into such navigable waters, either by ordinary or high tides, or by storms or floods, or otherwise, whereby navigation shall or may be impeded or obstructed: *Provided*, That nothing herein contained shall extend or be construed to extend to the casting out, unloading, or throwing out of any ship or vessel, lighter, barge, boat, or other craft, any stones, rocks, bricks, lime, or other materials used, or to be used, in or toward the building, repairing, or keeping in repair any quay, pier, wharf, weir, bridge, building, or other work lawfully erected or to be erected on the banks or sides of any port, harbor, haven, channel, or navigable river; or to the casting out, unloading, or depositing of any material excavated for the improvement of navigable waters, into such places and in such manner as may be deemed by the United States officer supervising said improvement most judicious and practicable and for the best interests of such improvements; or to prevent the depositing of any substance above mentioned under a permit from the Secretary of War, which he is hereby authorized to grant, in any place designated by him where navigation will not be obstructed thereby.

SECTION 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty, or structure of any kind, outside established harbor lines, or in any navigable waters of the United States where no harbor lines are or

may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters; and it shall not be lawful hereafter to commence the construction of any bridge, bridge-draw, bridge piers and abutments, causeway or other works, over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War; or to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of the channel of said navigable water of the United States, unless approved and authorized by the Secretary of War: *Provided*, That this section shall not apply to any bridge, bridge-draw, bridge piers and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw bridge, bridge piers and abutments, or other works, under an act of the legislature of any State, over or in any stream, port, roadstead, haven or harbor, or other navigable water not wholly within the limits of such State.

SECTION 8. That all wrecks of vessels and other obstructions to the navigation of any port, roadstead, harbor, or navigable river, or other navigable waters of the United States, which may have been permitted by the owners thereof or the parties by whom they were caused, to remain to the injury of commerce and navigation for a longer period than two months, shall be subject to be broken up and removed by the Secretary of War, without liability for any damage to the owners of the same.

SECTION 9. That it shall not be lawful for any person or persons to take possession of or make use for any exclusive purpose, or build upon, alter, deface, destroy, injure, obstruct, or in any other manner impair the usefulness of any sea-wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States in whole or in part, for the preservation and improvement of any of its navigable waters, or to prevent floods, or as boundary marks, tide-gauges, surveying-stations, buoys, or other established marks; nor remove for ballast or other purposes any stone or other material composing such works.

SECTION 10. That the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters in respect of which the United States has jurisdiction, is hereby prohibited. The continuance of any such obstruction, except

bridges, piers, docks and wharves, and similar structures erected for business purposes, whether heretofore or hereafter created, shall constitute an offense; and each week's continuance of any such obstruction shall be deemed a separate offense. Every person and every corporation which shall be guilty of creating or continuing any such unlawful obstruction in this act mentioned, or who shall violate the provisions of the last four preceding sections of this act, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five thousand dollars, or by imprisonment (in the case of a natural person) not exceeding one year, or by both such punishments, in the discretion of the court. The creating or continuing of any unlawful obstruction in this act mentioned may be prevented, and such obstruction may be caused to be removed, by the injunction of any circuit court exercising jurisdiction in any district in which such obstruction may be threatened or may exist; and proper proceedings in equity to this end may be instituted under the direction of the attorney-general of the United States.

SECTION 11. That it shall be the duty of officers and agents having the supervision, on the part of the United States, of the works in progress for the preservation and improvement of said navigable waters, and, in their absence, of the United States collectors of customs and other revenue officers, to enforce the provisions of this act by giving information to the district attorney of the United States for the district in which any violation of any provision of this act shall have been committed: *Provided*, That the provisions of this act shall not apply to Torch Lake, Houghton County, Michigan.

SECTION 12. That section twelve of the river and harbor act of August eleventh, eighteen hundred and eighty-eight, be amended and re-enacted so as to read as follows:

Where it is made manifest to the Secretary of War that the establishment of harbor lines is essential to the preservation and protection of harbors, he may, and is hereby authorized, to cause such lines to be established, beyond which no piers, wharves, bulk-heads or other works shall be extended or deposits made, except under such regulations as may be prescribed from time to time by him; and any person who shall willfully violate the provisions of this section, or any rule or regulation made by the Secretary of War in pursuance of this section, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding one thousand dollars, or imprisonment not exceeding one year, at the discretion of the court, for each offense.

[C.]

[See page 7 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS TWENTY-FIFTH DAY OF SEPTEMBER, IN THE YEAR EIGHTEEN HUNDRED AND NINETY, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND THE NEW ENGLAND DREDGING COMPANY, A CORPORATION DULY ESTABLISHED UNDER THE LAWS OF SAID COMMONWEALTH, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work specified and described in the following specifications for widening a channel on South Boston flats, all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth:—

Specifications.

The party of the second part is to furnish all the plant, tools, appliances and labor necessary to widen, by dredging, a channel about 5,400 feet long on South Boston flats.

The location and dimensions of the channel, and the widening required, are more exactly shown on a plan on file in the office of the Board of Harbor and Land Commissioners, entitled "Plan for widening channel on South Boston flats, September, 1890. Scale 3400." Said plan is referred to and made a part of these specifications.

The channel is to be widened, on its southeasterly side, so as to have the following dimensions, — that is to say, so as to be, after

the work is completed, 12 feet deep at mean low water and 110 feet wide on the bottom, with slopes 2 to 1 on each side, for a distance of 4,100 feet from its westerly end, and the remainder of the distance 8 feet deep at mean low water and 115 feet wide on the bottom, with slopes 2 to 1 on each side.

The amount of material to be removed to widen the channel as above described, is about 69,000 cubic yards.

The least present depth of water on the above area is 0.9 feet at mean low water, and the average depth is about 3 feet.

The whole channel to have throughout, when the work is completed, the depth of water, width and side slopes described above and shown on said Plan; but no dredging to be required in that part of the channel already excavated to the depths above specified, except to remove such material as may be forced or dropped into it in the work of widening.

No extra payment or allowance to be made for any excavation below the required depth or outside the prescribed limits of the channel.

All ledges and bowlders and other obstructions which may be found, and which can be removed by dredging, to be removed as part of the contract without extra payment or allowance; but if any ledges or bowlders are found which cannot be removed by dredging, the covering material to be dredged away, and the ledges and bowlders left bare to the depth aforesaid; and the Engineer of said Board to be the sole judge to determine whether any ledge or bowlder can be removed by dredging or not.

All of the material dredged to be deposited on the South Boston flats, at such places on said flats as may from time to time be directed by said Engineer; and all dumping of such material to be done within one hour and one-half before or after high water. If dumped at the elevating station of the New England Dredging Company, the rules established by said company to govern such dumping, and the instructions of its authorized agent in charge of said station to be observed and followed.

The said party of the second part to fill, with part of the material excavated, the trench in rear of the sea-wall on the north-erly side of the reserved channel on said flats, to as high a grade as practicable, and to furnish suitable scows or other appliances for doing this to the best advantage, and to the satisfaction of said Engineer.

The aforesaid Plan, and the surveys and calculations based thereon, are believed to be correct; but said party of the second part must examine for itself, as no allowance will be made for any errors or inaccuracies which may be found therein.

In all questions which may arise concerning measurements, lines and grades, the decision of said Engineer to be final.

All necessary aid and materials for giving or indicating lines and grades, to be furnished by said party of the second part at its own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of said Engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of said Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

The work to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; and to be fully completed on or before the thirty-first day of December, 1890.

Estimates to be made by said Engineer of the amount of work done up to the end of each calendar month, and payment to be made thereon of 75 per centum of the proportional part of the whole contract price applicable to such work, as computed by said Engineer; and the remaining 25 per centum to be paid upon the final completion and acceptance of the whole work.

If said party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from breach thereof.

The word "Engineer," as used herein, means the Engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of nine thousand nine hundred and fifty dollars (\$9,950), said sum to be in full therefor, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council; and the said New England Dredging Company, by Charles H. Souther,

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its president and treasurer, thereunto duly authorized, has caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS,

BY JOHN E. SANFORD, }
JOHN I. BAKER, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

NEW ENGLAND DREDGING COMPANY,

BY CHARLES H. SOUTHER, [SEAL OF THE NEW ENGLAND
DREDGING CO.]
President and Treasurer.

In Council, October 1, 1890. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

HENRY B. PEIRCE, *Secretary.*

[D.]

[See page 39 of this Report, *ante*.]

LEASE OF HANGMAN'S ISLAND.

THIS INDENTURE, made this first day of January, in the year eighteen hundred and ninety, between the Commonwealth of Massachusetts, acting by its Board of Harbor and Land Commissioners, and S. Albert Freeman, of Boston, in the County of Suffolk and Commonwealth aforesaid,

WITNESSETH, that the said Commonwealth doth hereby lease unto the said S. Albert Freeman, that tract of land in Boston Harbor known as Hangman's Island, to hold for the term of three years from the date hereof, in trust, nevertheless, for the uses and purposes, and upon the terms and conditions, hereinafter set forth, that is to say :

That, Whereas, said island is now occupied by Lawrence Hogan, Owen Hogan, Nathan S. Brown, James E. Hassett, William E. Greenfield, John R. Putnam, James Powers, Joseph Powers, and Thomas McKinley, fishermen, as a fishing station ; and whereas said S. Albert Freeman, although not a fisherman, is the owner and interested in the ownership of certain personal property situated on said island, and used by said fishermen in the prosecution of their said business ;

Now, therefore, the said S. Albert Freeman, trustee as aforesaid, is to hold said leased premises in trust for himself and the above named Lawrence and Owen Hogan, Nathan S. Brown, James E. Hassett, William E. Greenfield, John R. Putnam, James and Joseph Powers, and Thomas McKinley, and all of said persons are to have the same and equal privileges upon said island and in the occupancy thereof ; and the use and occupancy thereof shall, during said term, be and continue substantially the same as heretofore, and all of the persons aforesaid shall have

and enjoy an equal share in the control and management of said premises, and shall contribute to said Freeman in equal proportions the rental thereof, which is to be paid as hereinafter set forth.

And it is expressly provided as one of the terms and conditions of this lease and of occupancy under the same, that no intoxicating liquors of any kind shall be stored, kept or sold on said island; and it is further understood that in case any person named as beneficiary herein shall for the space of one year neglect or refuse, upon demand in writing by said Freeman, to pay to said Freeman his proportion of the rental herein specified, then and in that case his rights herein shall terminate and cease; and in case said Freeman shall neglect to pay promptly to the Commonwealth the rent herein reserved, such neglect shall be and operate as a resignation of said trust and as a surrender of all his interest herein, and such other person may be designated as trustee hereunder as may be in writing agreed upon by the parties hereto. But nothing herein contained shall be construed to excuse said trustee from the prompt payment of the rent herein reserved at the time the same becomes due as herein set forth, or to prevent a forfeiture of this lease in case of non-payment of rent.

And the said Freeman, trustee as aforesaid, agrees to pay to said Commonwealth the sum of fifty dollars as rent for each and every year during the term hereof, the same to be payable on the first day of July annually, and not to lease or underlet the premises or any part thereof, and not to sell or assign this lease; and at the end of said term to quit and deliver up to said lessor or its agents or servants, said premises peaceably and quietly. And it is expressly understood that no alteration in the shores or surface of said island shall be made, and no structure built below high water mark, without the written consent and license of the Board of Harbor and Land Commissioners; and that all persons in danger by perils of the sea, or from stress of weather, or otherwise, shall have full and free right to land upon said island. And said Board of Harbor and Land Commissioners, and such other servants and agents of the Commonwealth as may be designated for that purpose, may at all times enter upon any part of said premises, and may at any time expel said lessee and any other persons claiming under this lease, if he or they shall fail to pay the rent as aforesaid, or shall fail to keep any of the terms and conditions of this lease.

In witness whereof, the said Commonwealth, acting by its Board of Harbor and Land Commissioners, has caused these presents to be executed in its name and behalf, and to be approved

by its Governor and Council, and its seal to be hereto affixed ;
and the said S. Albert Freeman, trustee as aforesaid, has here
unto set his hand and seal, the year and day first above written.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD,	}	<i>Harbor and</i>
JOHN I. BAKER,		<i>Land</i>
CHAS. H. HOWLAND,		<i>Commissioners.</i>

S. ALBERT FREEMAN.

[SEAL.]

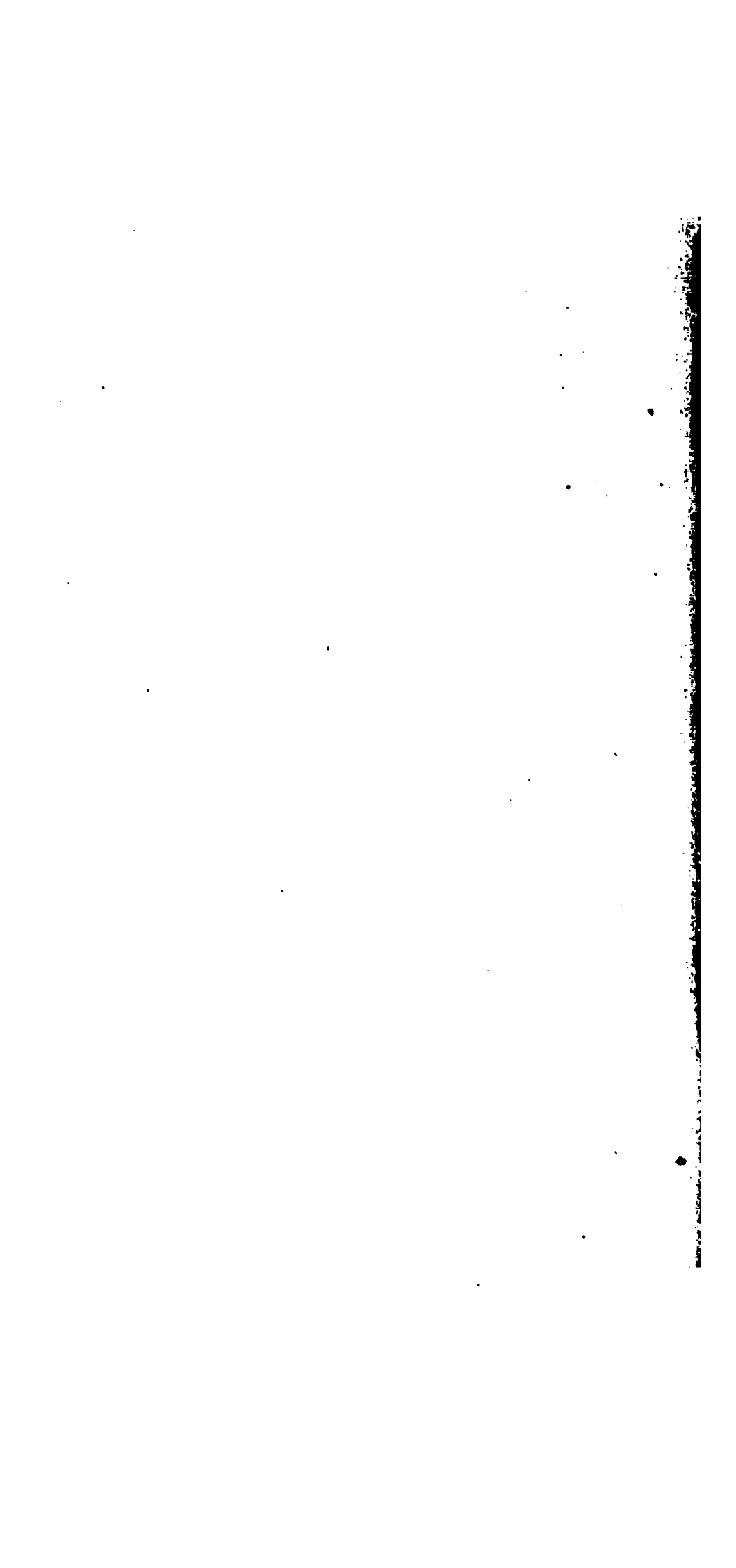
Witness, JOHN A. NOONAN to S. A. F.

In Council, March 19, 1890. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

HENRY B. PEIRCE,
Secretary of the Commonwealth.



PUBLIC DOCUMENT

. . . . No. 11.

ANNUAL REPORT

OF THE

HARBOR AND LAND COMMISSIONERS

FOR THE YEAR 1891.

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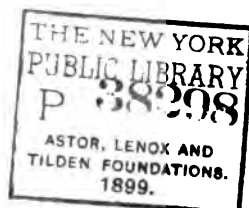


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Commonwealth of Massachusetts.

HARBOR AND LAND COMMISSIONERS' REPORT.

To the Honorable the Senate and the House of Representatives of the Commonwealth of Massachusetts.

The Board of Harbor and Land Commissioners, in accordance with the provisions of law, respectfully submits its Annual Report for the year 1891.

EAST BOSTON BRIDGE.

Chapter 386 of the Acts of 1891, entitled "An Act relating to the building of a bridge connecting the city of Boston proper with East Boston," provides as follows:—

The Board of Harbor and Land Commissioners shall make an investigation into the subject of building a bridge over tide water connecting the city of Boston proper with East Boston; and for such purpose they shall receive and consider such plans for such bridge as the city of Boston or any other party may offer. Said board shall make a full report of their investigations to the next General Court; and shall state in their report whether in their opinion such a bridge can be built without inflicting serious damage upon the wharf property, and materially injuring the commerce of the Commonwealth. And if any plan for said bridge is approved by them, they shall set forth the same in their report.

After public notice in the newspapers, and special notice to persons and corporations known to be actively interested for or against the building of a bridge as proposed, an investigation in compliance with the act was begun in

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the Green Room in the State House on October 28, and continued by adjournments from time to time to December 18, 1891. Ten public hearings in all were had. Both sides were ably represented by counsel. Some twenty persons, including prominent citizens of East Boston, appeared to urge their views or to give testimony in favor of a bridge; and more than twice that number, many of them representing large public or private interests, were heard to show reasons against its construction. Others remonstrated by communications in writing. The Boston Marine Society protested by a committee appointed and sent for the purpose, and the Boston Merchants Association by adopting and transmitting resolutions. A large amount of documentary and statistical evidence was also introduced on either side.

A stenographic report was taken by arrangement of the counsel on both sides, and a limited number of copies printed for the convenience of those engaged in the investigation. The printed report makes a volume of over 500 pages, with an appendix of 152 pages, to which are annexed copies of several plans and exhibits introduced at the hearings.

It is obviously impracticable within our present limits to cite or even refer in detail to all the oral and written evidence adduced on the one side and the other. All that can be attempted will be to summarize as fully as may be the facts and considerations which were presented, and which seem to have a material bearing on the questions at issue.

The Board was instructed by the act to "receive and consider such plans for such bridge as the city of Boston or any other party may offer." Only one plan was offered, which will be presently described.

The suggestion of a suspension or elevated bridge, high enough to allow vessels of all sorts to pass under it, was made at the hearings, but was rejected by the advocates of a bridge as out of the question by reason of its cost. It was also objected to such a structure that the lowness of

the shores on either side of the harbor would require the approaches to begin too far inland to suit the convenience of those desiring to use it.

A sub-way or tunnel, though having some obvious advantages for "rapid transit," was objected to in like manner as being dark, damp, dangerous to health, unserviceable for vehicles on runners in times of snow, and undesired by the people of East Boston; and as not being within the scope of the investigation prescribed in the act.

For these reasons, the only plan formally considered was one prepared by the city engineer and offered by the city of Boston.

This plan locates the proposed bridge at the narrowest part of the harbor, just north of the North Ferry, on a line extending a little diagonally across the channel from Battery wharf on the Boston side to Maverick wharf on the East Boston side.

The length of the bridge and approaches is about 2,600 feet from Commercial Street in Boston to Sumner Street in East Boston, about 2,100 feet between abutments, and about 1,450 feet between harbor lines. The width of the bridge proper is 80 feet; of the draw-bridge (which is about 310 feet long), 60 feet.

The draw is a "swing" draw, supported and revolving on a stone pier of about 60 feet diameter placed midway between the harbor lines, with openings of 100 feet on each side for the passage of vessels. From this central pier, a pile pier about 80 feet wide, intended for the protection of the draw and the guidance of vessels through it, extends about 300 feet below and the same distance above the bridge, a little diagonally to the bridge, but parallel with the channel.

The bridge proper is supported on 10 stone piers, 5 on each side of the central draw pier. Six of these piers (3 on each side) come between the harbor lines, the span or distance between the piers being about 180 feet. These 6 bridge piers, with the central draw pier and other structures connected with the draw, occupy and obstruct altogether

about 175 feet of the width of the channel or water-way between the harbor lines.

The height of the under side of the draw above mean high water, is 35 feet. The bridge descends from the draw towards either end on a grade of 3 feet in 100, so that the clear height of the bridge at the harbor lines is reduced to a little less than 20 feet above mean high water.

The length of the corresponding ascent (with 3-foot grade) from either end of the bridge to the draw, is about 1,150 feet, or nearly one-quarter of a mile. For this and perhaps other reasons, it is believed that the bulk of the heavy-team travel would take a ferry in preference to the bridge.

The estimated cost of the bridge is \$2,000,000.

Such being the location and character of the proposed bridge, the question which the Board is directed to answer is "Whether, in its opinion, such a bridge can be built without inflicting serious damage upon the wharf property, and materially injuring the commerce of the Commonwealth."

The question admits of a merely categorical answer; but it is to be presumed that the General Court, in requiring the Board to "make a full report of its investigations," desired such a statement of the grounds of the conclusion arrived at, as should furnish some test of its correctness and of the weight to be attached to it.

The district of East Boston, which it is desired to connect with the city proper by a bridge, is of comparatively recent settlement and growth. The first male child born there, we are told, is still living "a hale and hearty man."

By the census of 1890, East Boston had a population of 36,930, — a little less than one-twelfth of the population of the whole city. The comparative growth in population of the several divisions of Boston from 1885 to 1890, is shown in the following table:—

DISTRICTS.	Population in 1885.	Population in 1890.	Increase.	Percentage of Increase.
Charlestown, . . .	37,673	38,348	675	1.79
South Boston, . . .	61,534	66,791	5,257	8.54
The City proper, . . .	147,138	161,330	14,192	9.65
EAST BOSTON, . . .	31,419	36,930	5,511	17.54
Roxbury, . . .	65,965	78,411	12,446	18.87
Brighton, . . .	8,523	12,032	3,509	41.17
Dorchester, . . .	20,717	29,638	8,921	43.06
West Roxbury, . . .	17,424	24,997	7,573	43.46
City of Boston, . . .	390,393	448,477	58,084	14.88

The valuation of East Boston advanced from \$17,948,800 in 1885 to \$21,193,475 in 1891,—an increase of over 18 per cent.

In view of the above figures, the enterprising citizens of the "Island wards," dissatisfied as they are with their present rate of progress, will be likely to challenge the conclusion of the Bureau of Statistics of Labor, as stated in its analysis of the census of Boston in 1885, and reiterated in its report on the census of 1890, that East Boston "has practically reached its limit of expansion."

The reasons alleged in favor of a bridge, are substantially these:—

That East Boston has outgrown the facilities afforded by the ferries; that the boats are crowded at times, are subject to delays, obstruction by heavy teams, and occasional stoppage by fogs; that passengers are thereby exposed to discomfort, risk of accident and loss of time; that the maintenance of the ferries is expensive to the city, and that it would be as cheap or cheaper in the long run to build and maintain a bridge; that the tolls, although recently reduced one-half, are still an unjust tax; that East Boston has not been duly cared for, in comparison

with other sections of the city, as regards its means of communication with the centre of business and population ; and that, for these reasons, its growth has been retarded.

It is claimed, conversely : —

That a bridge would stimulate the growth of East Boston ; increase its population ; build up its industries ; attract new enterprises ; enhance market and taxable values ; develop and create a demand for its unoccupied lands and water front ; help to solve the problem of “ rapid transit ” ; and, while thus giving a new life and fresh impulse to East Boston, would benefit the entire city of which it is a part, and be a convenience to the people of Chelsea, Revere, Winthrop, and portions of Essex County.

This is the case as presented by the advocates of a bridge ; and we have endeavored not to understate it. It is not, however, the whole case.

Before considering the expediency of a bridge, it may it may be well to notice the complaints against the present ferry system.

There is some diversity in the testimony of persons residing or doing business in East Boston, in regard to the amount of the annoyance and delay experienced in the use of the ferries. It is not denied, however, that there is some ground of complaint. For about two hours in the morning and evening, and on some public holidays, it is agreed that the ferries are overtasked and crowded, as is not unusual with other lines of suburban travel. There are also occasional detentions by fogs and other stoppages and mishaps, not unlike those which occur on street cars from snow storms, blockades, breakdowns, and other familiar causes.

But it is quite irrelevant to inquire Whether the delays and annoyances of travel on the ferries, as at present equipped, are greater or less than on other suburban lines. The more pertinent question is Why they occur, and whether they can be remedied. Before the inconveniences complained of, whether more or less severe, can be used to justify the building of a bridge across Boston harbor, it must appear that they are inherent in the ferry system, and

admit of no ready or practicable relief. In other words, it must be proved that the capacity of the ferries to serve the public has been exhausted.

Quite the reverse of this appears to be the fact. No better proof can be required than is found in the official Report for 1889 of the Directors of East Boston Ferries to the city council of Boston, to which we were referred, and in which it is said :—

They [the Directors] beg to remind your honorable body that no material changes or additions increasing the facilities of this department, have been made since the city purchased the ferries in 1870, while the passenger travel has increased from 5,000,000 to 10,000,000 annually, and the number of teams in proportion, as may be seen by the detailed statement hereunto annexed.

The rapid increase of travel for the past ten years impresses them with the importance of making ample provision for its continuance, which they feel justified in anticipating, basing their judgment upon the natural facilities which this section of the city affords for manufacture and commerce, and the large tracts of land yet unimproved.

The territorial dimensions of the ferry property is insufficient. The people of the Island wards are familiar with this fact, and have so expressed themselves through their representatives in the City Council, and also in business assemblies.

The improvements asked for will increase the industries and enhance the value of real estate in East Boston, which would consequently become an additional source of revenue to the city, and, in their judgment, in a short time more than compensate it for the proposed outlay.

The present condition of the property, without reference to design or convenience, is fair. There are, however, parts which have been many years in service, in consequence of which they have deteriorated to such an extent that they deem it advisable to have them renewed at once. There are other parts which will need alterations and repairs, all of which should be done in order to ensure safety and confidence.

In view of the above statements, it is not surprising that the Directors felt obliged to recommend the outlay for improvements of even so large a sum as \$500,000, which they apportion as follows :—

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For property on each side of the North Ferry,	\$200,000 00
For two new ferry-boats,	100,000 00
For two new slips,	50,000 00
For two new drops and tanks,	30,000 00
For alterations of present slips,	20,000 00
For new head-house on East Boston side,	30,000 00
For additions to head-house on Boston side,	10,000 00
For dredging,	10,000 00
For contingent expenses,	50,000 00

Adding to the above report the testimony at the hearings, there is good reason to believe that the running of an additional boat during the hours of crowded travel, with improved drops, would alone remove most of the present grounds of complaint.

No time need be spent in showing that well-equipped and well-conducted ferries have also some advantages, as compared with other methods of highway travel.

Whether or not the building of a bridge would be an economical measure for the city of Boston, depends very much on the further question Whether the city would still have to maintain the ferries.

It seems to be generally agreed that the South ferry must be continued, at least until a second bridge shall have been built across the harbor somewhere near its line. The clerk of the Ferry department, an intelligent witness of long experience in connection with the ferries, is of the opinion that, even if a bridge were built, there would still be a demand for two ferries, and that, if not run by the city, private parties could make money by running them.

The fact that the proposed bridge, by reason of its long and difficult grades, would be unsuited to the use of heavily loaded teams, — as already noticed in the description of the bridge, — would of itself practically determine the necessity for the continuance of a ferry near its proposed site.

It was supposed that the Brooklyn suspension bridge would supplant the ferry lines, or some of them, between that city and New York. On the contrary, they are said to have multiplied.

The purpose of East Boston to demand sooner or later an additional bridge or bridges across the harbor, was distinctly announced at the hearings. If, after building the bridge now asked for, Boston must still maintain one or both of the ferries; or if it must satisfy the coming demand for more bridges, so that, as was suggested, East Boston shall be connected with the city proper by bridges across the harbor the same as South Boston across Fort Point channel,—it needs no demonstration that it would be far cheaper and better, not only to renovate the existing ferries, but to make them free.

We have thus far spoken of the proposed bridge as if it raised only ordinary questions of public convenience and municipal economy. We have referred, but only by way of description, to its proposed *location*. It remains to consider the extraordinary interests, both public and private, which such a bridge, in such a location, would necessarily involve.

We are confronted with a proposition *to bridge a harbor*,—not a stream tributary to a harbor, nor a mere arm or inlet of a harbor,—but to bridge across its middle the harbor itself,—and that harbor the chief harbor of Massachusetts and New England, one of the great public harbors of the United States, and of no mean rank among the commercial harbors of the world.

And it is proposed to bridge it with a structure of such character that the steamships and vessels which carry the cargoes of to-day, and which are growing larger year by year, cannot pass under it, but must either run the gantlet of its draw, or abandon their accustomed docks.

It is a novel and startling proposition. There is no precedent for a bridge like this in any commercial harbor of the world. Can Boston or Massachusetts afford to establish such a precedent?

The capacity of a harbor for commerce, other things being equal, is measured by the extent of its improved deep-water frontage. Safe and ample approaches and channels of entrance are essential to a good harbor; but they are of

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no value to commerce except as they lead to docks and wharves where merchandise can be unloaded and shipped. Where its wharves and docks are, there, for purposes of commerce, the harbor is.

Throwing out of the account all the improved frontage to be found above the lowest existing bridges on the Charles and Mystic rivers and Chelsea creek,—and it is very far from being insignificant in amount or value,—*one-half* of the harbor of Boston, as it has been developed by more than two centuries of improvement for commercial use, is *above* the line of the proposed bridge. To be exact, there are 57,820 feet of deep-water wharf line below the proposed location, and 57,576 above it before coming to any existing bridge.

The importance of this upper half of the harbor is recognized to the extent that the bridge is to be provided with a draw; but the moment the bridge is built, the interests of those who use the harbor for navigation, and of those who want the bridge for travel, come into conflict; and these interests are so directly opposed, and in this case so large, that they cannot be reconciled.

One of two results must inevitably follow:—*Either the bridge will destroy the navigation, or the navigation will destroy the value of the bridge as a public highway.*

Let us first assume that the interests of commerce will prevail, and the present navigation continue. What, in that case, will be the value of the bridge as a highway for travel?

Those familiar with the harbor know that all vessels passing through the draw of the Charles River bridge, the north and south draws of the Chelsea bridge, and the draw of the Meridian Street bridge, (these being the lowest existing bridges,) must cross the line of the proposed bridge, both in going up the harbor to reach those draws and in coming down the harbor on their return.

According to the Report of the Boston Bridge department for 1890, the whole number of vessels of all kinds passing through the draws in question during that year, was 28,754, classified as in the following table:—

NAMES OF BRIDGES.	VESSELS PASSING THROUGH THEIR DRAWS.				
	Steam- ers.	Sailing Vessels.	Tugs.	All Others.	WHOLE NUMBER.
Charles River,	17	3,663	2,611	1,822	8,113
Chelsea (North draw), .	122	805	4,538	3,487	8,952
Chelsea (South draw), .	7	1,027	3,954	2,355	7,343
Meridian Street, . . .	97	765	2,553	931	4,346
Totals,	243	6,260	13,656	8,595	28,754

The report furnishes no further data for determining how many of the 28,754 vessels could go under the proposed bridge, and how many of them would require the opening of its draw.

To the above number must be added the number of the passages (up and down) of all the steamers, sailing vessels and other craft that go to the wharves or anchorage ground above the site of the proposed bridge, but stop below all the existing bridges, and so do not appear in the above table. There is no official or other complete record of their number; but the evidence tends to show that it largely exceeds the number of those in the table, and that a greater proportion of them would require the opening of the draw.

Rough estimates for a year or day can be based on the above data; but the most exact evidence of the whole number of steamers and vessels of all kinds passing the line of the proposed bridge in 24 hours, was an actual count made October 30 and 31 last, which was produced at the hearings by counsel in favor of the bridge.

The count gave the following footings: —

Whole number of vessels passing October 30,	279
" " " " " 31,	317
Number requiring opening of draw October 30,	121
" " " " " 31,	128

It is worth remarking that six ocean steamers passed on the first day, and seven on the second day, of the count.

So far as appeared, both days were average days for the time of year. The number of vessels going up and down varies with the season and the weather. It is largest in the summer and early autumn. After a change of wind, coast-wise vessels often come into the harbor in fleets.

Assuming that the count in question gives the fair average for business days with weather admitting of navigation, (say 300 days in the year,) and that the average for the other 65 days would be only one-quarter as large, — the whole number of vessels passing the site of the proposed bridge would be 94,242 a year, 39,373 of which would require the opening of the draw.

Taking, without attempting to cite, all the evidence before us, making all due allowances, and assuming that the draw would have to be opened and closed at short intervals in order to accommodate alternately the travel on the bridge and vessels desiring to pass, — it seems to be safe and within bounds to estimate that, for not less than 300 days in the year, the draw would require to be opened on the average *not less than 100 times a day* for the passage of vessels ready and waiting to go through.

How long on the average would the bridge have to be closed to travel at each opening of the draw? A good deal of testimony was given on this point, with a considerable range of estimates. The lowest figures will suffice.

The estimate by the engineer who planned the bridge, of the time required for getting the gates on the bridge closed, for opening and closing the draw, and for delay in starting and accidents, was 6 minutes. He thought that this time, “if everything worked smoothly,” could be reduced to 3 or 4 minutes. We accept the lower figures. This estimate, however, makes no allowance for the time required for getting the vessel through the draw. We will assume that this will take on the average only 3 or 4 minutes more. This makes 6 to 8 minutes in all for each opening of the draw.

If then, as we have found, the draw must be opened 100 times in a day, the bridge must be closed to travel 600 to 800 minutes in a day, — that is, *from 10 hours to 13½ hours* out of the 24.

According to the count * before referred to, more than eleven-twelfths of this time would have to come out of the 12 hours from 6 A.M. to 6 P.M.

We are aware that many of the experienced pilots and tow-boat captains who testified before us, will consider the above estimates, or some of them, almost absurdly low. They will probably be right in so doing. It would not be difficult to deduce from what seems to be reliable expert testimony, the conclusion that, in order to accommodate navigation, the bridge must be closed to travel, if that were possible, more than 24 hours in a day.

But there is no occasion for nice calculations. It is needless to prove too much. Our estimates will bear even further reduction, and the fact still remain that the bridge would be worthless for public travel.

To avert a conclusion so fatal to the project, it was urged that certain classes of steamers and vessels might adopt the use of "telescoping" smoke-stacks, and masts of such device that they could be lowered or inclined, so as to pass under the bridge without opening the draw. One instance was cited of the use of a stack of this sort on a river passenger boat; and a witness was produced who had seen a mast of this description on one ballast lighter in London 40 years ago, and several within 10 years on small trading craft in the Celebes Islands. Both devices are wholly in disuse by American sea-going vessels of any kind.

It would be humiliating, to say the least, to publish to the world that steamers, barges, lighters, or any other craft that are able to use with entire facility all other civilized ports, could hereafter engage in the commerce of Boston harbor only by lowering their smoke-stacks and dipping their masts.

* The count for both days showed 549 vessels passing from 6 A.M. to 6 P.M., and 47 from 6 P.M. to 6 A.M.

We come now to the important and decisive question, What would be the effect of the bridge,—be its value more or less as a highway,—upon wharf property, and upon the commerce of the Commonwealth?

The term *wharf property*, as used by the General Court in ordering this investigation, and as here used, means something more than so many square feet of land covered by a wharf, and valued as so much per foot on the assessors' lists.

It includes (in this case) the Navy Yard of the United States. It includes all the improvements and outlays that have been made in developing the harbor front above the proposed bridge, and in establishing there deep-water plants for commercial, manufacturing and other business purposes. It includes the extensive and costly terminal facilities which have been provided for the joint use of great connecting lines of land and water transportation. It includes consequentially the value of the trade and business, foreign and domestic, which have been built up by means of these improvements and facilities, and which depend for their successful prosecution on free and uninterrupted access to the sea.

It is impossible to state in exact figures the money value of all the property and interests thus involved. It must be very large,—several times, at least, the entire valuation of East Boston.

The immovable property of the Navy Yard plant, which embraces an area of over 86 acres in extent, and has an excellent frontage of almost a mile in length, has been officially estimated at \$30,000,000.

The Hoosac Tunnel docks, now owned by the Fitchburg Railroad Company, have cost, including elevator and other facilities for export business, over \$2,250,000. Three foreign steamship lines, the Leyland, Allan, and Furness, run regularly to these docks; and it is estimated that one-half of the export business of the port of Boston is there transacted. During the first 10 months of the past year,

139 ocean steamships, 493 schooners, and 13 barks, (645 vessels in all), discharged and loaded at these docks; and the business is increasing year by year.

A great portion of the business of the Fitchburg or Tunnel line is the transportation of merchandise to the seaboard. It is essential to this business that the access to its docks shall be safe and convenient for the connecting steamship lines, or they will cease to come there. Such a result would affect not merely the value of the docks, but impair the value of the entire property of the railroad company, some \$40,000,000 in amount.

The fact that the Commonwealth has spent a good many millions of dollars in building the Hoosac Tunnel line, and now holds \$5,000,000 of its securities, can hardly be urged in this connection. If the State sanctions the bridge, it takes the risk of the consequences, so far at least as its own interests are concerned.

The Mystic docks and terminal grounds, some 100 acres in extent, situated between the north and south channels of the Mystic river estuary, partly below and partly above the Chelsea bridge, have recently been acquired and developed for the uses of the Boston and Maine railroad system. This property has been over 30 years in process of improvement, and represents a very large outlay to its present owners.

An important business has already grown up there under the new and energetic management. The docks below the Chelsea bridge are well adapted to ocean steamers, and are intended to be used for export purposes. An extensive coal and coastwise business, for which the facilities are ample, is rapidly developing at the docks and terminal grounds above the bridge.

Among the scores of other wharves and docks and business plants above the proposed bridge, and below all existing bridges, may be mentioned Battery wharf, Constitution wharf, Fiske's wharf, Gray's wharf, Bartlett's wharf, Comey's wharf, the wharf and works of the Boston Gas Light Company, and the Tudor Company's wharf, on the Boston and Charlestown side; and the wharves and estab-

lishments of the Atlantic Works, Boston Tow Boat Company, East Boston Dry Dock Company, Atlantic Dyewood Company, Boston Dyewood and Chemical Company, C. A. Campbell & Company, Green's wharf and dry dock, Pratt's wharf, and Emery's wharf, on the East Boston and Chelsea side. Others might be named of equal and perhaps greater importance.

Large and important interests in East Boston and Chelsea earnestly oppose a bridge, and the people on that side of the harbor are by no means unanimous in its favor.

No one can, or does, question that a bridge across a navigable water-way, unless of sufficient height and span to allow all vessels to pass freely under it, is, under any and all circumstances, an obstruction to navigation, a damage to the wharf property and water front above it, and an injury to commerce. The extent of the injury varies only in degree, and is to be measured by the magnitude of the interests involved.

It is estimated that the damage to wharf property in general, above the proposed bridge, would be from 25 to 50 per cent. of its present value, depending somewhat on its location relatively to the bridge, and on the class of shipping or the character of the business for which it has been developed. The important wharves just above, as well as those just below, the bridge, would suffer a special injury from their proximity to it. These wharves are now used by the larger class of steamers and vessels, and the bridge, with its long draw piers extending some 300 feet up and down the channel, would make access to their docks difficult and, in some conditions of wind and tide, impracticable.

In measuring the injury to the commerce of the Commonwealth which would result from a bridge such as is now proposed, one important fact must not be lost sight of, — and that is the remarkable increase in the *size* of the steam and sailing vessels by which the commerce of the port of Boston, in common with other commercial ports, is now carried on.

We shall present, on a subsequent page, a table, by which

it will be shown that, while the *number* of vessels engaged in the foreign commerce of this port during the five years 1887–1891, is 20 per cent. less than for the five years 1864–1868, their average *tonnage* is over 139 per cent. greater; in other words, their number is one-fifth less than 23 years ago, and their average tonnage nearly two and one-half times as great.

There is no corresponding record of the number and tonnage of vessels engaged in domestic trade; but the increase in size has not been less striking. The two-masted schooner has given place to the schooner of three and four masts, or to the barge and “whale-back” steamer.

The increase in size is still going on, both in ocean and coastwise vessels.

It is to vessels of large tonnage, and especially to the great ocean steamers, that a draw-bridge is most dangerous and objectionable. The value of ship and cargo not infrequently approaches or exceeds \$1,000,000,—too large a venture to be hazarded by any avoidable risk.

All ships hitherto entering the port of Boston, have had, while passing the site of the proposed bridge, a free and open passage-way of more than a quarter of mile in width. They would now be compelled to pass through a gap of 100 feet in width, in the mid-channel of an already crowded harbor, and where the currents are the swiftest and most variable.

Will the owners of these large ships and costly cargoes expose them to this new peril? The agents and superintendents of the ocean lines, and the steamship commanders, are unanimous in the opinion that they will not.

It may be well to let the captains state the difficulties in their own way. Captain Parry, master of the new steamship *Lancastrian*, of the Leyland line, and the largest of its fleet, says:—

I have run into the Hoosac Tunnel docks as captain of an ocean steamer for ten years, and am familiar with the harbor. The new steamer *Lancastrian*, which I command, has a tonnage of 3,321 tons registered, and is 458 feet long over all, with a beam of 45 feet. Loaded, she draws 26 feet of water on the main, and about 28 feet aft.

No ship-owner or captain would take such a vessel through the draw in the proposed bridge. Under the most favorable circumstances of wind and tide, and with no vessels in the way, it is possible that it might be done safely; but the risk would be so great that nobody would undertake it. The cost of my vessel was £80,000, and the passage of this draw would be a greater peril of the sea than its owners would be willing to expose it to.

In order to pass through this draw with proper steerage-way, the vessel would have to attain a speed of five miles an hour, and it would be impossible to stop her in time to clear the Navy Yard. Going out, the situation would be equally serious. It would be necessary to know not only that the draw was open before the steamer got under headway from the dock, but also that there was nothing in the way either above or below the bridge, as it is impossible for my steamer in the harbor to turn out for the various vessels which it meets in its passage.

When the steamer is loaded with cattle and leaving the dock, it rolls at an angle of thirty degrees. In order to pass through the draw under such circumstances, it would be necessary to use hawsers. No rope would hold the vessel while rolling in this manner, and the distance is too short to have steerage-way to attempt to go through. That is, going out.

As to the suggestion . . . that the vessel, on approaching the bridge, could cast anchor and wait for the draw to be opened, — the effect of this proceeding would be, in certain states of the wind and tide, to cause the vessel to swing around to one shore or the other, and sweep everything in its course, doing great damage to itself and other vessels.

There is no comparison between passing through the proposed draw and entering the Liverpool dock. The former would be vastly more difficult and dangerous. We go to a basin there the whole length of the ship, and out of the tide. Also, a bridge would alter the course of the tide both south and north of the bridge.

Without going into further detail, I should unhesitatingly say that the construction of the proposed bridge would be such an obstruction to commerce that the Leyland line of boats would undoubtedly be withdrawn from the Hoosac Tunnel docks.

The contract by which the Leyland line has agreed for a term of years to dock exclusively at the Hoosac Tunnel docks, contains the *proviso*, that, "if the navigation to said piers or berths, or the use thereof, shall be or become dangerous by the erection of a bridge across Boston harbor," the agreement may be terminated.

Captain Thompson, master of the *Stockholm City*, of the Furness line, says :—

I am captain of the steamer *Stockholm City*, one of the Furness line, plying between Boston and London, and docking at the Hoosac Tunnel docks, where I have been running for the past six years.

If the proposed bridge is built with a draw opening of one hundred feet, I am sure that no captain or owner of an ocean steamer would take the risk of running through the draw. The approach now to the Hoosac Tunnel docks and the wharves in that vicinity is difficult, and sometimes dangerous, on account of the various tides and currents, and vessels have narrowly escaped disaster while approaching the same. If the bridge were built as proposed, the increased danger from such cause would be so great that I am confident that the owners of the Furness line would withdraw their vessels from the Hoosac Tunnel docks.

No ocean steamer, to my knowledge, has ever been voluntarily subjected to such a peril as the passage of this draw would involve, and the risk is altogether too great to be run.

The statement of Captain Meyerdiercks, master of the *Cremon*, of the Hansa-Johnston line, is to the same effect :—

I am captain of the steamer *Cremon*, of the Hansa-Johnston line, plying between Boston and Antwerp, now docking at the Hoosac Tunnel docks. If the proposed bridge is built, I think it would be a serious obstruction to navigation, and would render the approach to the Hoosac Tunnel docks so difficult and dangerous that no prudent ship-owner would attempt it. In my judgment, it would cause the lines now running to these docks to be abandoned.

The export cargoes of the steamship lines now docking at the Hoosac Tunnel docks, are brought to the seaboard by the Fitchburg road and its connecting railroad lines. Under any existing or probable through arrangement, they would not come by any other railroad line. If the steamships could find other docks below the bridge, the necessary railroad connection would no longer exist.

These great connecting lines of land and water transportation have been established, and are maintained, with great effort and under disadvantages. If Boston had peculiar inducements to offer as compared with other ports,

or if the differential rates were in its favor, it might venture to diminish the facilities which its harbor now affords. If it cares to retain or increase its present commerce, it must be vigilant for their enlargement.

A former Collector* of the port, in speaking of the Maverick bridge scheme of 1868, (to be noticed hereafter,) said with equal truth and pungency, in a letter to one actively engaged against that project:—

I am glad that you are interested in opposing the mad idea of a bridge across the centre of Boston harbor. If it succeeds, notice should be given that no commerce is wanted at this place. I would also suggest two finger-posts, — one pointing toward New York, and one to Portland.

The bridge is, of course, for people to go to and from Boston proper and East Boston; but no one will wish to go either way, if we give up our harbor and lose our commerce.

The Boston pilots, experienced and clear-headed men, agree in substance with the steamship masters, — that, with favoring wind and tide, by taking time and using every precaution, with the assistance of tugs, and with the way clear below and above the bridge, an ocean steamer might be taken through the draw without accident or injury; but that it would always be a matter of some difficulty, and, with unfavorable wind or tide, or other adverse circumstance, would be a hazardous undertaking; and that there would be many days in the year, — on an average one day in five, — when it would not be prudent to attempt it.

The momentum of one of these great ships, when heavily loaded, although moving slowly, is tremendous; and if it should fail to clear the bridge, or in rolling should strike it, the consequences to the ship, or to the bridge, must be very serious. The danger of such injury is greater to an iron than to a wooden vessel.

If the bridge were built, the Charlestown Navy Yard would undoubtedly be abandoned as one of the great naval depots of the country; and its value for any maritime

* Hon. Thomas Russell.

use, national or commercial, or for sale, would be greatly diminished.

On the day of one of the public hearings in this investigation, a fresh wind, but not of unusual violence, was blowing from the southwest,—a “side” or “cross” wind for vessels passing the proposed draw. On the morning of that day, the first-class war frigate *Newark* left her dock at the Navy Yard, and dropped anchor in the stream to make her final preparations for sea.

A veteran pilot of 44 years experience in Boston harbor, (and of 43 years residence at East Boston,) gave it as his opinion that, even if the *Newark* had been under “fighting orders,” she could not on that day have been taken out through a 100-foot draw without serious damage; although she might otherwise have gone to sea without delay.

The bridge would prove a serious obstruction not only to ocean and naval steamships, but to the larger coastwise shipping. The officers of the Merchants and Miners Transportation Company, and of the Boston and Philadelphia Steamship Company, testified that they would not dock their steamships above the bridge; and that, if they could not find accommodations below, they should prefer to abandon their business or transfer it to other ports.

If there were no other objections, the unavoidable delays in getting through the draw would be a fatal obstacle to all shipping propelled by steam and requiring dispatch. Loss of time and of regular trips is serious loss of money.

Rapid transit is as desirable and necessary for commerce as for public travel. All vessels having occasion to pass to and fro in the harbor,—lighters, floating elevators, dredgers, the larger tow-boats, all steamers and vessels going to coaling stations, ship-yards, dry docks, or elsewhere, for supplies or repairs, would be subjected by a draw-bridge to constant annoyance, loss of time, and consequent loss of money.

That there would be frequent and serious delays to all kinds of vessels in passing the draw, experience leaves no room to doubt. Such has been and is the fact in the

case of all the existing highway bridges, to say nothing of the railroad bridges, across the rivers and channels tributary to the harbor.

The superintendent of the Boston Tow Boat Company testified from long experience, and without contradiction, as follows :—

We have got a lot of bridges in Boston now, that we can't get through in half an hour's time. Many a time I have come up to these [Congress Street, Charles River, and Warren] bridges, and blown my whistle for them to take off, and asked them to take off, — that is, signalled for them to take off ; and I would lie to, and then I would be from three-quarters of an hour to an hour in getting through from the time I got there.

In the struggle between navigation and public travel, the draw-tender is an important factor. He is, and must be, vested with a large discretion. He is a city official ; and, however honest and well-meaning, he will feel the stronger pressure brought to bear by the people who travel on the bridge, with whom he comes in immediate contact, and upon whose good-will his position may more or less directly depend.

Navigation, as compared with public travel, always stands the poorer chance. The odds are against it. As navigation loses, public travel becomes more aggressive. Sooner or later we hear the already familiar demand for shutting the draw during portions of the day, and finally for closing the water-way to navigation altogether.

However it might turn out in the present case, and under the most favorable circumstances, the number of vessels, as before shown, would be so great that there must be much waiting and loss of time. After certain stages of wind and weather, if not as an ordinary occurrence, vessels would be likely to collect below or above the bridge beyond the capacity of the draw, and in sufficient numbers to obstruct the harbor and to discommode and endanger each other.

Boston harbor has many natural advantages, which place it on the whole in the first rank ; but the capacity of its upper basin for anchorage, is already very much limited.

Above the proposed bridge, and below existing bridges, there is a water area of some 360 acres in extent, much of it having a least depth of 23 feet* at mean low water, which affords the best protected anchorage ground of the upper harbor. By cutting off free access to this anchorage ground, the bridge would seriously diminish the safety and convenience of the harbor for commerce. With its long draw piers, it would also of itself occupy much of the room now available for the movement or anchorage of vessels.

A bridge would add to the burdens of the commerce of the port. Every ton of coal carried above it must pay three cents more freight per ton,—a tax which in the end the consumer must pay. The expense for tug-boat service would be increased; and the loss resulting from inconvenience and delay, as already stated, would be constant and unavoidable. Commerce is sensitive to all such burdens.

The effect of a bridge placed at the neck of the upper harbor, with its 11 solid piers contracting the channel, would be to accelerate the flow of the already swift and variable currents, to increase the scour and lift the material from the bottom, carrying and depositing it where it may be most injurious to the harbor.

The piers would also have a tendency to hold and collect the ice above the bridge, and thus to block the upper harbor to navigation in the winter season.

It is admitted, even by its advocates, that the bridge would work some detriment to wharf property, that steamers going above it might be delayed and put to some expense, and that its effect might be to drive some of them away from the wharves above its proposed site. Its advocates claim, of course, that there would be full compensation in other directions for the injury done.

The able solicitor of the City of Boston, however, looks the issue squarely in the face. He does not hesitate to de-

* The national government has added 30 acres to this deep-water area, by removing the Man-of-War and Mystic shoals, under appropriations by Congress.

clare the opinion that, instead of hurting commerce, it would greatly benefit Boston commercially to build the proposed bridge without any draw in it; and, by thus cutting off all navigation above it, lead to the development of better wharves and docks lower down the harbor.

In support of this somewhat radical suggestion, plans were introduced to show where and how the lower harbor could be developed.

The first plan offered was described by the engineer* who drew it, as "a mere chalk to show the possibilities of development." The second plan bears the marks of a more experienced and skilful hand. When it was first prepared, some ten years ago, it was described by its ingenious framer† as a "preliminary" plan "to illustrate the possibilities of the harbor."

Both plans take in the improvement of the South Boston shore already in progress; but the main and novel feature of each, is an immense scheme for the creation of wharves and docks off the lower East Boston shore, extending by the former plan down to Governor's Island and Apple Island, and by the latter nearly down to those islands, and thence around to Point Shirley in Winthrop.

Professor Whiting testified in regard to the latter plan as follows:—

In this study, I regarded at the outset what we call the inner harbor, as simply a basin. The area in the main basin, which is [according to the plan] about 3,000 feet wide down to Governor's Island and Castle Island, compares about with the London docks, and is a little larger than the present London docks. They have about 1,000 acres, and this has about 1,100 acres. They cost about \$60,000,000 to construct, and the scheme for carrying out this improvement is of equal magnitude.

We do not criticise the plan. On the contrary, it does credit to the large conceptions and constructive genius of its author. The only question now is, Whether it furnishes any reason or excuse for the destruction of one-half of the existing harbor of Boston, or promises any present or

*Nathaniel H. Crafts.

†Prof. Henry L. Whiting.

near relief to commerce after that blow shall have fallen upon it.

A careful estimate shows that it would cost \$30,000,000 to wall in and fill the area of some 1,500 acres which the project includes. To this must be added the cost of the railroad extensions, avenues, and other facilities and improvements necessary to make it available for commercial use.

A scheme of much smaller dimensions, for developing a portion of the East Boston shore, known as the East Haven scheme, was agitated some years ago, but was lost sight of with its ill-starred projector.

Who will undertake this grander project? Who volunteers to pay the cost of the work? Who, judging from past experience, will guarantee that it shall be completed within the next century? Would it not be wise to provide the new harbor before destroying the old?

And if East Boston, as now situated, requires closer connection with the city proper, how will the Apple Island district find adequate means of communication? After commerce shall have re-established itself below the bridge now proposed, what assurance can it have that it will not find itself again and again cut off by still lower bridges for the accommodation of those remoter wards?

And besides, it may be asked, Upon what principle of public policy or public morality is it proposed to destroy or impair the property and interests of one section of the city, and thereby to develop and build up those of another section? It surely will not be attempted or proposed without provision for full and adequate compensation to the former. Who shall pay this compensation? And after all has been done, what will the city or the public have gained in wealth or commercial resources?

We have referred to the above schemes of improvement, because they were urged upon our attention as removing objections to a bridge which it is proposed to build at once. In our judgment, they have no immediate or practical bearing on the subject. However well conceived on paper the plan for creating a new commercial harbor off the

lower East Boston shore, it can be viewed, for any present purpose, only as one of the speculative possibilities of a remote and shadowy future.

The General Court has charged us with the investigation of "the subject of building a bridge over tide water connecting the city of Boston proper with East Boston," as if it were a new question. We have so treated it. It is to be decided upon the facts and conditions of today, and not upon those which existed 20 years ago.

As a matter of history, however, the question has once before been carefully considered and decided.

June 11, 1868, an act (chapter 352) was passed by the legislature of that year, (the objections of the governor to the contrary notwithstanding,) "to incorporate the Maverick Bridge Company." The act authorized that company to build a bridge connecting Boston and East Boston as now proposed.

In less than a month thereafter, July 7, 1868, a joint resolution was adopted by Congress, in the following terms:—

Be it Resolved, etc., That the Secretary of the Navy shall detail two competent and impartial officers of the navy, and the Secretary of War shall detail a competent and impartial officer of the engineer corps, who shall compose a commission, whose duty it shall be to make careful examination of the harbor of Boston, and shall report to Congress, at its next session, in what manner the commerce of said harbor, and the interests of the United States in the navy yard at Charlestown, will be affected by the construction of a bridge over the water between the main-land in the city of Boston and East Boston, in the manner provided in an act of the legislature of the State of Massachusetts, entitled "An Act to incorporate the Maverick Bridge Company"; and no bridge shall be erected by said company across said water until the assent of Congress* shall be given thereto.

* A public law of the United States, passed at the First Session of the Fifty-first Congress, chapter 907, section 7, approved September 19, 1890, now provides that "it shall not be lawful hereafter to commence the construction of any bridge, bridge-draw, bridge piers and abutments, cause-way or other works, over or in any port, road, roadstead, haven, harbor, navigable river, or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War."

Rear-Admirals Stringham and Bell of the U. S. Navy, and Brigadier-General Simpson, Colonel of Engineers, U. S. Army, were appointed to constitute the commission.

The commission met at the Navy Yard in Charlestown, September 16, 1868, and after sixteen sessions, at most of which "written statements of their reasons for advocating or opposing the proposed bridge" were received from all parties interested and desiring to be heard, made a unanimous report, which is summed up as follows:—

The commission, having now, as it believes, presented all the facts and statements of both parties, and given its own reasoning in the premises, respectfully concludes with the emphatic opinion:—

1st. That the commerce of the harbor of Boston will be very seriously and injuriously affected by the erection of the proposed Maverick bridge, or by any bridge from Boston proper to East Boston,—except a suspension bridge which would allow the passage of vessels of the first class under it at any point.

2d. That the interests of the United States in the navy yard at Charlestown, will be very seriously damaged by such bridge.

3d. That a bridge between the points mentioned should not be authorized.

This report was transmitted to Congress in January, 1869, and referred to a committee. Congress did not give its assent to the building of the bridge. The same year, by chapter 155 of the Acts of 1869, the Massachusetts legislature repealed the Maverick bridge act.

The Maverick bridge was to be located substantially where it is proposed to locate the present bridge.

Its plan differed from the present plan in the following particulars:—

It was to have 3, instead of 11, stone piers, including the draw piers in both cases.

It was to have a uniform height of 30 feet above mean high water, instead of 35 feet at the draw and thence declining to less than 20 feet at the harbor lines.

The draw was to have two openings of $162\frac{1}{2}$ feet, instead of 100 feet, each.

On the whole, the Maverick bridge would have been a much better bridge, both for the harbor and for navigation, than that now proposed.

No higher authority can be found upon the question now before us, than that of the commission which sat upon the Maverick bridge case in 1868 ; and, unless the effect of its finding can be avoided, it must be accepted as decisive of the present case.

It is, however, sought to avoid it upon the ground that there has been a change in the conditions existing in 1868. The change alleged is in the fact that the population of Boston and East Boston, and of adjacent cities and towns, has largely increased since 1868 ; and it is argued that “ the necessities of this great mass of people demand more and better facilities for getting into and from the city.”

This argument has no force unless it is further shown that population has grown faster than commerce. Facilities for suburban travel are not, to say the least, a greater public necessity than facilities for commerce. The fact that Boston is the business and commercial centre, is what makes suburban travel.

We propose to show, on the other hand, that commerce has grown faster than population ; and that the demands of suburban travel, instead of being greater, are relatively less, than they were in 1868.

We shall also prove that the commerce of Boston has grown faster than its valuation ; and is therefore a more important factor relatively to capital and wealth, than it was in 1868.

The growth in population and valuation of Boston as a whole, and of the district of East Boston, from 1870 to 1890, — the census years nearest the beginning and end of the period under comparison, — is shown in the following table : —

Increase in Population and Valuation of Boston and East Boston from 1870 to 1890.

	1870.	1890.	Percentage of Increase.
Population of Boston,* .	250,526	448,477	79.0
Population of East Boston, .	23,816	36,930	55.1
Valuation of Boston,* .	\$630,355,762	\$822,041,800	30.4
Valuation of East Boston, .	13,296,900	20,458,675	53.9

* Including annexations.

The largest percentage of increase shown in the table is 79 per cent., and the smallest 30.4 per cent.; and the average increase of population and valuation, for both Boston and East Boston, is about 55 per cent.

We are indebted to the courtesy of the present Collector * of the port of Boston, for the following statistics of the foreign commerce of the port for two periods of five years each, ending respectively with the years 1868 and 1891, — the years in which the former and the present bridge projects have been under discussion.

The number and tonnage of vessels entered and cleared during each of these periods (already referred to in another connection on page 21 of this Report), are also shown for convenience in this table.

Foreign Commerce of the Port of Boston — Comparison of Two Periods of Five Years each, ending 1868 and 1891.

	FISCAL YEARS.		Percent- age of Increase.
	1864-1868.	1887-1891.	
Value of imports,	\$179,783,754	\$325,742,962	81.2*
Value of exports,	88,066,062	330,559,613	275.4
Totals,	\$267,849,816	\$656,302,575	145.0
Number of vessels entered, .	14,882	11,996	19.4†
Number of vessels cleared, .	15,000	11,914	20.6†
Totals,	29,882	23,910	20.0†
Total tonnage of vessels entered,	3,398,979	6,894,260	102.8
Total tonnage of vessels cleared,	3,251,175	5,839,878	79.6
Totals,	6,650,154	12,734,138	91.5
Average tonnage of vessels entered,	228 tons.	575 tons.	151.6
Average tonnage of vessels cleared,	217 "	490 "	126.2
Totals,	445 tons.	1,065 tons.	139.2

* Hon. A. W. Beard.

† Decrease.

The import trade of Boston, then, has increased 81 per cent. in the last 23 years, and the export trade (a most gratifying exhibit) 275 per cent., — and both together 145 per cent. Population and valuation have grown meantime, as before shown, about 55 per cent. In other words, the *foreign* commerce of Boston has grown nearly *three times* as fast as its population and valuation.

The *domestic* trade and navigation of the port of Boston have increased in a still larger ratio. There is no corresponding official record to show this, but it is proved by established or admitted facts.

While the tonnage of both foreign and domestic vessels is from two to three-fold greater than 23 years ago, the number of vessels engaged in foreign commerce has somewhat diminished, — as the above table shows. But the number of vessels engaged in both kinds of commerce, has largely increased. This must be due to the greater expansion of domestic trade and shipping.

All that the opponents of the Maverick bridge claimed or attempted to prove in 1868, was that 16,486 vessels passed the draws of the upper bridges, and that 32,972 vessels in all passed the site of the proposed bridge, in the course of a year; and the counsel for the bridge protested that those figures were grossly exaggerated.

We have shown by official records that 28,754 vessels passed the upper draws in the year 1890; and the evidence introduced by the counsel for the present bridge, corroborated by all the other evidence in the case, leaves no doubt that from 75,000 to 100,000 vessels each year are now passing its proposed site.

Other facts and statistics, and the testimony of competent witnesses who appeared before us, all tending to the same result, might be cited to strengthen the conclusion; but the above figures alone, taken in connection with the large increase of tonnage, are sufficient to show that the *domestic* trade and shipping of Boston have grown *more than three times* as fast as its population and valuation.

No reason is apparent why the commerce of the port of Boston, both foreign and domestic, should not continue to

grow at an equal or even greater rate of increase. No one had cause to anticipate so large a growth as has just been shown.

A gentleman * thoroughly conversant with the subject, has furnished, at our request, a sketch of the development of the foreign steamship commerce of the port of Boston, which will be found in the appendix † to this Report.

Its period of marked growth appears to have begun about the year 1875. The sailings of foreign steamships have since more than quadrupled, and now average more than one daily. New and important branches of trade have been opened. The rates of freight from Liverpool have been reduced by increase of business and competition to about one-fifth of what they previously were.

The Hoosac Tunnel docks had not been built in 1868, and the steamship lines which now run to them, were unknown to this port. The proposed bridge would cut off from free access to the sea the half of the harbor which has received much of the more recent and best development; and would tend to discourage and drive away from Boston trade and business, both foreign and domestic, which it is highly desirable to retain and foster.

We find, then, that so far as conditions have changed, the interests and claims of commerce are relatively very much greater, and the reasons against a bridge far stronger, than when the Maverick bridge scheme was considered and condemned by the commission of 1868.

The commerce of the port of Boston is rightly described in the act directing the present investigation, as "the commerce of the Commonwealth." We shall spend no time in trying to prove or illustrate its importance and value to the people of the whole Commonwealth. The legend of our fathers — *By Agriculture we Live, by Commerce we Thrive* — is still an axiom whose truth no one questions.

* Mr. William H. Lincoln, of Brookline, Mass., agent of the Leyland steamship line.

† See Appendix, A.

The harbor and commerce of the port of Boston are not things of a day gone by. Utterances and suggestions to this effect are not unheard, but they are either the groundless croakings of the pessimist, or covers for further designs upon the harbor.

We regret to say it, — but it is too true, that Boston harbor requires to be oftenest and most anxiously defended against the ill-judged measures of those who ought to be, from public spirit or official duty, its most zealous protectors.

The time has not come, and there are as yet no signs of its coming, when Boston harbor, with its tributaries, tidal reservoirs, and water frontage, will have no higher value than for parks and boulevards; or when the treatment and preservation of the harbor will turn on no larger considerations than those of merely local convenience.

The question of a bridge is not a local question. The harbor does not concern the communities alone who dwell on its shores. It does not belong to Boston or East Boston, one or both. It belongs to the Commonwealth. It belongs to the nation that improves and defends it. State and nation alike hold it in trust for the commerce of the world.

The arguments against the Maverick bridge, — and they apply with even greater force to the bridge now proposed, — were summed up in 1868, in one terse and vigorous sentence, by Commodore John Rodgers, then commandant of the Charlestown navy yard: — “*No nation which has the skill to design the Maverick bridge would grant permission to build it.*”

The enterprise and ambition of the people of East Boston are highly commendable, and the growth and prosperity of that section, as of all sections of the State, are much to be desired.

The communities that border on the harbor reap the richest harvests from its commerce, and are most deeply concerned in its protection. A blow aimed at the commerce of Boston could hardly fall with heavier disaster upon any section of the city than upon East Boston.

The building of the proposed bridge, instead of advancing, would, in our judgment, hurt the interests of East Boston; and would prove to be a costly mistake both for it and for the city of which it is a part.

The Brooklyn suspension bridge, under which foreign shipping has no occasion to pass, has a clear height of 135 feet, and a span of 1,595 feet;

The Firth of Forth bridge, Scotland, a clear height of 150 feet, with spans of 1,700 feet;

The Poughkeepsie bridge, across the Hudson, a clear height of 163 feet;

The Washington bridge, across the Harlem River, 125 feet;

The proposed bridge from Blackwell's Island to Long Island, 153 feet;

The proposed bridge across the Hudson from Seventy-first street, New York, to the New Jersey shore, a clear height of 150 feet, with a central span of 2,200 feet, and two side spans of 1,050 feet each.

No bridge should be built from Boston to East Boston which is not high enough to allow all vessels to pass freely under it, and whose span is not equal to the distance between the harbor lines.

In conclusion, we respectfully report to the General Court, That, in our opinion, a bridge connecting East Boston with the city proper, of the character now proposed by the city of Boston, (1) would inflict serious damage upon the wharf property, which is of large amount and value, situate above and adjacent to its proposed site; and (2) would materially injure the commerce of the Commonwealth.

We earnestly recommend that no authority be granted for the building of such a bridge.

No plan for a bridge across the harbor, connecting East Boston with the city proper, which does not call for a clear height of not less than 150 feet above mean high water, and a span of at least the distance between the established harbor lines, should, in our judgment, receive the sanction of the General Court.

SOUTH BOSTON FLATS.

The work of filling and improving the tide-water lands of the Commonwealth at South Boston has been continued without material change in the plan or methods of operation.

The 100-acre lot, all of which is inclosed and filled, and on a portion of which the streets have been graded with gravel, is in substantially the same condition as at the date of the last report. The sewers and other improvements are in good order.

There have been sold from this lot the past year 14,281 square feet of land, lying between Congress and Fargo streets, for \$7,140.50. Several parcels on the water front, 12,500 square feet in all, are leased on such terms as not to interfere with any permanent disposition of the territory which it may be desirable to make hereafter.

During a violent gale in the latter part of March, five schooners and three mud-scows broke loose, and were driven with great force against the bulkhead on the northerly side of the 100-acre lot. The bulkhead was old, and received so much damage that it was thought best to build a new one, parallel with the old, but 20 feet nearer the proposed exterior line of occupation on the harbor front.

A contract* was made May 7, 1891, with Mr. William Miller to build the new bulkhead for the sum of \$5,489. The work was satisfactorily completed and accepted July 3, 1891. The 20-foot space between the old and new bulkheads has been filled with waste material, brought in carts without cost to the Commonwealth, excepting the wages of a man to superintend the dumping.

In the same gale, some powder-boats broke loose and drifted against the new bulkhead on the northerly and easterly sides of the 75-acre lot, damaging portions of it quite badly. A contract† was made April 16, 1891, with Mr.

* See Appendix, B.

† See Appendix, C.

George H. Cavanagh to repair and strengthen this bulk-head, for the sum of \$3,300. The work was satisfactorily completed and accepted July 27, 1891.

Progress of the Work.

The new work of the last year has been mainly expended on the 75-acre lot, which adjoins the 100-acre lot on the east.

Under the contract with the New England Dredging Company, made April 8, 1889, the terms of which have been stated in previous reports, about 135,000 cubic yards of material have been deposited on this lot the last year, equivalent when levelled to about 9 acres, and making in all 27 acres of land filled to grade 13 under this contract.

By its terms, the contract expired with the last year. Some material received by the contractor still requires to be elevated, deposited and graded. About 30,000 cubic yards of material remaining to be dredged under a contract of the United States for work at East Boston, may also be received and handled under the contract before it is finally closed.

An auxiliary contract* was made with the same company June 25, 1891, for filling, with material dredged from the reserved channel, to a higher grade than then filled, a strip 30 feet wide on the 75-acre lot back of the sea-wall on the northerly side of the channel, for a length of about 1,000 feet, the more effectually to stop the flow of water and waste of material through the wall caused by the rise and fall of the tide.

The work was to be completed August 31, 1891. About 7,600 cubic yards of material were deposited in August, in partial execution of the contract, when the contractor required the dredge for other work, and has not since resumed the work called for by the contract. The work done, however, proved sufficient for the purpose desired, and the contract will be closed as it now stands.

* See Appendix, D.

Two comparatively small areas remain to be filled on that portion of the 75-acre lot south of Congress Street. At the same time the Commonwealth is bound by the terms of its agreement made July 1, 1887, and approved June 13, 1888, with the littoral proprietors of the north shore of South Boston, to dredge to its full width that portion of the reserved channel west of L Street, to which the sea-wall now extends.

Proposals were therefore invited by public advertisement in December just past, for dredging the channel and filling the above areas under one contract, providing at the same time for the receiving, elevating and depositing on the 75-acre lot, south or north of Congress Street as may be directed by this Board, such other dredged material as may be offered by the United States or other parties pending the execution of the contract.

The bids were opened on the last day of the year. Some of them were based on new methods of hydraulic dredging, and were the most favorable ever received for such work on the South Boston flats. The contract is expected to be awarded and closed at an early day.

Congress Street.

In view of the importance of Congress Street, as being the most direct and convenient public avenue by which access is had to the Commonwealth's land, and, when finished, by far the shortest and best thoroughfare for business and travel between the centre of the city and South Boston, the work of the last year has been directed to its speedy completion.

Congress Street extends across the territory of the Commonwealth from B Street easterly to the reserved channel, a distance of more than half a mile, with a width of 75 feet. All the material required to complete the filling of the land under and adjacent to the street, to the line of the sea-wall on the reserved channel, was already in place, and was levelled the last spring, and the street made ready for grading to full grade 16 with gravel. It had previously been graded as far easterly as C Street.

A contract* was made May 28, 1891, with Mr. George H. Keyes, the lowest bidder, to complete the gravel grading from C Street to the sea-wall on the north side of the reserved channel, at 64 cents per cubic yard, the work to be finished by December 31, 1891. About 15,000 cubic yards of gravel had been delivered at that date, and about 900 feet in length of the street next the sea-wall had been completed. The rest of the work is well advanced, and is expected to be finished the present month.

Nothing has been done the past year to improve the crossing of Congress Street by the New York & New England railroad tracks. It is still dangerous for teams and travellers, both on account of the trains and by reason of the bad condition of the roadway.

The Cunningham Iron Works Company has begun and is now rapidly building extensive works for the manufacture of boilers and heavy machinery, on land purchased from the Commonwealth at the corner of Congress and B streets. It has now and will have more and more occasion to transport very heavy loads over this crossing in order to reach the city proper. The street ought to be paved and kept in good condition for the use of this and other enterprising corporations who may desire to locate their works on this territory.

A plan has been devised, and streets have been widened with reference to it, for a system of tracks by which all establishments locating on the land now owned by the Commonwealth may be directly connected with steam railroad lines. A license† has been given to the Cunningham Iron Works Company to build and maintain a temporary track across B Street, connecting its works with the tracks of the New York & New England railroad, until other means of connection shall have been provided.

L Street Bridge.

By chapter 388 of the Acts of 1891, the city of Boston was authorized and required to build and maintain a public highway bridge across the reserved channel, connecting

* See Appendix, E.

† See Appendix, F.

Congress Street as laid out and graded by the Commonwealth, with L Street as extended by the city to the southerly line of said channel.

The plans of the bridge, with a draw 40 feet in width, have been approved by us, and the city is about to award the contract for its construction.

Conditioned on the completion of the bridge before the first day of August next, the act provides that the Commonwealth shall reimburse to the city 40 per cent. of its cost. The city desires that the time be extended to the first day of December next. There seem to be good reasons for such extension, and we recommend that it be granted.

This bridge will complete the connection of Boston and South Boston by a broad and direct avenue (Congress Street) across the lands of the Commonwealth. It is to be regarded as an important and hopeful step in promoting the interests of South Boston, the city of Boston and the Commonwealth.

Commonwealth Playground.

By chapter 421 of the Acts of 1891, the city of Boston was authorized to use temporarily a parcel of the Commonwealth's land, bounded by C, D, and Cypher streets and Mount Washington avenue, for a public playground, to be known as "Commonwealth Playground."

This tract was part of a larger one which the city had previously been licensed to use for the same purpose by this Board. The city had inclosed it by a rough fence, and had spread a coating of ashes and some gravel over the surface. The fence has been moved the last season to the boundaries of the smaller area above described, but little else has been done to the playground.

Provision for Continuing the Work.

The balance in the "Commonwealth's Flats Improvement Fund" on the first day of January, 1891, available for carrying on the work, was \$100,694.86; to which there has been added during the year \$2,609.41 income of the fund, \$7,423.31 rents of land and proceeds of land sold, and \$20,000 paid into the fund from the treasury of the Commonwealth under the provisions of chapter 93 of the

Acts of 1889 and chapter 9 of the Acts of 1891; making a total of \$130,727.58 available for the work. Of this sum there has been expended during the year \$61,424.96, leaving an available balance January 1, 1892, of \$69,302.62. In order to provide for the work now in progress and in contemplation, it is estimated that it will be necessary to provide for the payment of \$75,000 into the fund the present year.

HARBOR LINES IN BOSTON HARBOR.

A harbor line board, consisting of General Abbott, Colonels Gillespie and Mansfield, and Major Livermore, Corps of Engineers, U. S. Army, was constituted by order of the Secretary of War in 1888, under section 12 of the river and harbor act of that year, to consider harbor lines in Boston harbor. At the date of the last report, lines had been defined for nearly all of the frontages of the harbor, and were described in that and previous reports.

The harbor line board recommended the last year lines for both sides of Charles River from Market Street bridge up to the Watertown dam; for the northerly side of the reserved channel, and for the main frontage of the Commonwealth's flats east of Slate ledge, at South Boston; and around Castle Island. These several lines were approved by the Secretary of War, January 29, 1891.

Plans showing the approved lines are on file in this office, and descriptions of them are appended * to this report.

The work of the harbor line board has thus covered the entire harbor front from Breed's Island on the north to Moon Island on the south, excepting the South Bay and the frontage of the Navy Yard.

In almost every case where the State had previously established harbor lines, these lines have been adopted without modification by the harbor line board as the lines beyond which no structure of any kind shall extend. In some cases, an inner "*bulkhead line*," beyond which no *solid filling* shall hereafter be permitted, has also been defined. Upon the whole, the harbor line system already established

* See Appendix, G.

by the laws of the State has been approved and confirmed.

The harbor line board has completed its intended work and has been dissolved.

CHARLES RIVER.

The Harvard bridge was opened to travel the first of September last, and is quite freely used by the public.

By an act of the legislature passed in 1888, the cities of Boston and Cambridge were required to widen the draws in the four highway bridges which cross Charles River next above the Harvard bridge, to 36 feet each. For reasons stated in a previous report, there was some delay in complying with the act. The work was taken in hand by the cities in 1890, and the widening of all the draws, has been completed the past year.

The Charles River Embankment Company has dredged from the river basin the last year about 166,000 cubic yards of material, and deposited the same upon its flats west of the Harvard bridge.

The filling of the estates on the Boston side, which was in progress at the date of the last report, has been practically completed, except some surface gravelling.

A large additional area of flats in the basin has been converted by these operations into deep water.

MYSTIC RIVER IMPROVEMENT.

This work involves the filling and improvement of about 90 acres of land and flats lying between the north and south channels of Mystic River. The original grant was to the Mystic River Corporation, in 1855, upon the condition of deepening and improving the river.

The Boston and Maine Railroad has acquired the rights and assumed the obligations of the original grantee. The time for the completion of the work was extended by chapter 240 of the Acts of 1891 to March 1, 1893.

During the last year 250,746 cubic yards of material have been dredged from the north channel of the river above Chelsea bridge, and deposited inside the sea-wall. From one-third to one-half of the required area in the north

channel has been dredged to the prescribed depth. About $85\frac{1}{2}$ acres are now filled to grade 14.5, and the remaining $4\frac{1}{2}$ acres require about 52,000 cubic yards of filling to bring them up to that grade.

In addition to the above, 21,877 cubic yards have been dredged from the south channel above the bridge, and the material carried to the South Boston flats.

The pile platform in front of the sea-wall on the north channel has been completed, 58,630 square feet having been built the last year. On the south channel, the pile platform above the bridge has been partially rebuilt and widened to its full width of 35 feet, 61,118 square feet having been built the past year.

The balance of the filling will probably be completed this year. The dredging in portions of the river has been to a greater depth than was originally contemplated, so that there has been no occasion for digging off the marshes further up the river as provided in the act of 1855. The greater depth was required to adapt the wharf to modern vessels, which have a much larger tonnage and deeper draft than the vessels in use in 1855.

SOUTH BAY.

Early in the last year a topographical survey of the South Bay was made, and a harbor line laid down which was recommended to the General Court for its approval. The harbor line recommended was established by chapter 309 of the Acts of 1891, which also contained provisions intended for the improvement of the bay in sanitary respects as well as for navigation. All previous harbor lines were abolished.

The Roxbury Central Wharf company was licensed June 30, 1891, to fill about 43 acres of flats out to the new harbor line on the southerly side of the bay, the material for filling to grade 12 to be taken from the basin bounded by the harbor line. The work has not yet been commenced.

Applications are also pending for filling large areas of shoal water on the easterly side of the New York & New England railroad.

NEPONSET RIVER.

In 1890, the A. T. Stearns Lumber Company petitioned the Board to assign a location where that company could improve the channel of the Neponset River by dredging, the same to be in compensation for tide water displaced in the construction of the company's wharves at Neponset.

The said company, the Putnam Nail Company, and others petitioned at the same time for the removal by the Commonwealth of certain shoals and deposits in the river.

A survey has been made the past year with a view to obtaining the necessary information and data upon which to act. The survey covers the river from Commercial Point to the lower highway bridge. Soundings have been taken from Commercial Point to the railroad bridge. The shoalest part of the channel lies between the wharves of the Stearns and Putnam companies, and it is this section of the river which the Commonwealth is asked to deepen.

The matter is still under consideration by the Board.

REMOVAL OF WRECKS.

Two wrecks have been removed the past year under the provisions of chapter 260 of the Acts of 1883.

The first was an old hulk which was found floating in Chelsea Creek by the harbor master in 1890, and was towed by him to the South Boston Flats, where it was liable to become a nuisance. After public advertisement, a contract* was made March 30, 1891, with Mr. George A. Lancaster for its removal. The work was satisfactorily done, and his bill was approved June 30, 1891.

The other wreck was the schooner "Aladdin," with cargo of sand, which was sunk near Mt. Washington Avenue bridge in Fort Point channel, having been damaged in passing through the draw of the New York & New England railroad bridge. Bids were invited from various parties, and a contract† was made June 4, 1891, with Mr. George W. Townsend, the lowest bidder, to remove the wreck for the sum of \$500 and the wreckage. The removal was successfully accomplished, and the contractor's bill was approved June 30, 1891.

* See Appendix, H.

† See Appendix, I.

GLOUCESTER, ESSEX AND IPSWICH BOUNDARY LINES.

The Board was directed by chapters 77 and 97 of the Resolves of 1889, to examine and define the boundary lines in tide water between the city of Gloucester and town of Ipswich, and between the towns of Essex and Ipswich, and to report to the General Court.

A full report was made to the last Legislature, giving the results of our investigation and survey, and recommending certain boundary lines in tide water, which were defined in the report, to be established by legislative act.

The city of Gloucester was not satisfied with the tide-water line between that city and the two towns as defined by us, and the whole matter was referred to the present General Court.

The *land* boundary line between Gloucester and Essex runs back about two miles inland from the shore, in what was intended to be a straight course, to an angle or corner between the said city and town. In this line there are four stone bounds, — one at the shore, one at the corner, and two at road-crossings between.

It has been agreed on all sides that the true boundary line in tide water between Gloucester and the two towns, would be the extension of this land line in the same course out to sea; and we so extended it. In finding this course, however, we ran back from the stone bound on the shore only to the next stone bound in the land line, disregarding the other two bounds farther from the shore.

It was claimed by Gloucester that we ought to have run back to the corner bound farthest from the shore; and that, if we had done so, we should have got a different course, and one more favorable to the claim of that city.

In August last our engineer, in company with the city engineer of Gloucester, made a re-survey, in which the position of all four bounds was determined by triangulation. He was also greatly assisted in the work by the courtesy of Mr. Eugene E. Pierce, of the Massachusetts Topographical survey, in pointing out the location of the bounds, and by the use of the signals which he had erected for the town boundary survey now making for the State.

As the result of this re-survey, it was found that the four bounds were *not* in a straight line; and that, if a straight line were drawn from the bound at the corner to the bound on the shore, both of the intermediate bounds would be on the Gloucester side of that line, — the one on the main road between Gloucester and Essex 233.4 feet from it, and the one near the entrance to the Essex poor-farm 58.3 feet from it.

It follows that, if the line joining the two end bounds were adopted as the proper line to be extended out to sea, it would give *less* tide-water area to Gloucester than the line extended and defined by us.

The boundary lines in tide water between the towns, and between the city and the towns, have long been the subject of dispute, and much litigation has resulted. It is more important that the lines be established somewhere, than that either party should get a few feet more or less of tide-water flats. It seems to us a matter of little importance which of the lines is adopted.

We think that the lines indicated in our last report are *substantially* fair and just; and that one or the other of the two lines should be established by the General Court.

FIELD AND OFFICE WORK.

Miscellaneous Surveys.

The work on the South Boston flats has, as usual, occupied the larger part of the time of the engineering force of the office throughout the year.

The following special surveys have also been made and field work done:—

In February and March, two plane-table sheets on a scale $\frac{1}{1000}$, covering the main portion of the South Bay, were made, and the plans transferred to one large sheet, on which a harbor line was laid down. In June, a third sheet on the same scale was made, which has since been transferred to the large sheet. These three sheets completed the survey, and show the whole of the water area of the bay. The triangulation for the above survey was made

in 1890; but it was found necessary to add three points, and reproduce one old one which had been obliterated. This was done in June last.

In April, examinations of the new Coggeshall Street bridge in New Bedford were made, upon the complaint of the board of public works of that city that the bridge as built did not conform to the plans approved by this Board; and such was found to be the fact.

In July, 23 triangulation stations were established and connected with the triangulation of the U. S. Coast and Geodetic survey, for a survey of the Neponset River from Commercial Point to the lower highway bridge. The last of July and first of August, the topography was plotted on a plane-table sheet on a scale $\frac{1}{2000}$, and soundings were then taken covering the river from Commercial Point to the railroad bridge, and plotted on the plane-table sheet. A section of the river between the wharves of the Putnam Nail and Stearns Lumber companies, has been plotted on a scale of $\frac{1}{1000}$.

In the latter part of August, 11 new stations, including four town bounds, were determined by triangulation in Essex and Gloucester, and plotted on a scale $\frac{1}{4000}$, the same as that of the survey of Essex River made last year.

A re-survey of the beach near the Gurnet in Plymouth was also made in August, and it was found that there had been no material change since the previous surveys.

In September and the first of October, 21 stations were established along the Connecticut River at Springfield, and their positions determined by triangulation from a base measured on the Boston & Albany railroad bridge. Based on these a plane-table sheet was made, showing both banks of the river for about 9,000 feet along and opposite the main business portion of the city of Springfield, and showing also the existing encroachments on the river within those limits.

In November and December, a plane-table survey plotted on a scale $\frac{1}{2000}$ was made of both banks of the Connecticut River at Hadley, for a distance of about 8,000 feet above the protective works which were built by the Commonwealth in 1889 and 1890.

In December, a survey of the Mystic River at West Medford, from the Boston & Lowell railroad bridge to the bridge at the pumping station of the Mystic water works, was made and plotted on a scale of $\frac{1}{5000}$.

Licenses Granted during the Year 1891.

The following licenses, one hundred and twenty in number, — the largest number ever granted in a year, — have been granted the last year. The licenses which are required under recent statutes for structures in the Connecticut River and in great ponds, as well as those in tide waters, are included in the list.

Nos.

1307. Petition of the Union Freight Railroad Company for license to dump snow and ice from Constitution wharf into Boston harbor. Granted January 1, 1891.
1308. Petition of the Cambridge Electric Light Company for license to build a wharf, partly solid and partly on piles, on Charles River in the city of Cambridge. Granted January 1, 1891.
1309. Petition of A. R. Eldridge & Company for license to build a wharf by filling solid on Monument River in the town of Bourne. Granted January 1, 1891.
1310. Petition of George E. Nickerson for license to build a dike in Muddy Cove in the towns of Harwich and Chatham. Granted January 1, 1891.
1311. Petition of the city of Boston for license to dump snow and ice into the rivers and tide waters in and around said city. Granted January 8, 1891.
1312. Petition of John Q. Adams and Charles F. Adams, trustees, for license to build a sea-wall and fill solid on Charles River in the city of Boston. Granted January 15, 1891.
1313. Petition of Isaac Pratt, Jr., for license to extend his piers, on piles, at the McKay wharf in Boston harbor at East Boston. Granted January 15, 1891.
1314. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a sewer and siphon across Belle Isle Inlet in the city of Boston and town of Winthrop, as authorized by chapter 439 of the acts of 1889. Granted February 5, 1891.

1315. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a sewer and siphon across Shirley Gut in the city of Boston and town of Winthrop, as authorized by chapter 439 of the acts of 1889. Granted February 5, 1891.
1316. Petition of George D. Emery for license to build a timber dock, pile pier and pile platforms in Boston harbor near the junction of Chelsea Creek and Mystic River in the city of Chelsea. Granted February 5, 1891.
1317. Petition of William H. Burke for license to widen and extend his wharf, partly solid and partly on piles, in Scituate harbor in the town of Scituate. Granted February 12, 1891.
1318. Petition of Colcord Upton for license to build a pile wharf at Baker's Island in Massachusetts Bay in the city of Salem. Granted February 12, 1891.
1319. Petition of the Boston Land Company for license to fill solid on Chelsea Creek at Breed's Island in East Boston. Granted February 19, 1891.
1320. Petition of Albin M. Richards for license to extend his wharf by filling solid on Mystic River in the city of Boston. Granted February 19, 1891.
1321. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a pumping station, sewer and siphon, across Chelsea Creek in the cities of Boston and Chelsea, as authorized by chapter 439 of the acts of 1889. Granted February 19, 1891.
1322. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a portion of section F of a main sewer in Charles River in the town of Watertown, as authorized by chapter 439 of the acts of 1889. Granted February 19, 1891.
1323. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a sewer and siphon across Malden River in the towns of Medford and Everett, as authorized by chapter 439 of the acts of 1889. Granted February 19, 1891.
1324. Petition of F. A. Merriam & Company for license to extend their wharf on piles in Dorchester Bay in the city of Boston. Granted February 26, 1891.
1325. Petition of Orray A. Taft for license to build a pile wharf in Boston harbor at Point Shirley in the town of Winthrop. Granted February 26, 1891.

1326. Petition of George B. Roberts for license to extend his wharf by filling solid on Charles River in the city of Cambridge. Granted February 26, 1891.
1327. Petition of the town of Winthrop for license to fill solid a portion of Washington Avenue bridge in Crystal Cove in the town of Winthrop. Granted March 12, 1891.
1328. Petition of E. P. Welch and George F. Welch for license to widen and extend their wharf on piles in Scituate harbor in the town of Scituate. Granted March 12, 1891.
1329. Petition of C. A. Boyd for license to extend his wharf by filling solid on Powow River in the town of Amesbury. Granted March 12, 1891.
1330. Petition of the Boston and Maine Railroad for license to replace its wooden bridge by an iron bridge across Parker River in the town of Newbury. Granted March 12, 1891.
1331. Petition of the city of Cambridge for license to widen the passage-way for vessels in Western Avenue bridge and to build a new draw-pier in said bridge on Charles River in the city of Cambridge. Granted March 12, 1891.
1332. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building an outfall sewer in Boston harbor at Deer Island, as authorized by chapter 439 of the acts of 1889. Granted March 12, 1891.
1333. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a pumping station, sewer and siphon, across Mystic River in the city of Boston, as authorized by chapter 439 of the acts of 1889. Granted March 12, 1891.
1334. Petition of the heirs of James A. Stetson for license to widen, extend and maintain their wharf on piles in Gloucester harbor in the city of Gloucester. Granted March 25, 1891.
1335. Petition of Frederick Mason for license to build a boat-house on piles on Taunton Great River in the city of Taunton. Granted March 26, 1891.
1336. Petition of the Butchers Slaughtering and Melting Association for license to build a sea-wall and pile platform and to fill solid on Charles River in the city of Boston. Granted April 9, 1891.
1337. Petition of the New England Dredging Company for license to build a pile structure on Charles River in the city of Cambridge. Granted April 9, 1891.

1338. Petition of Henry L. Pierce for license to build a bridge across Neponset River in the city of Boston and town of Milton. Granted April 23, 1891.
1339. Petition of William H. Quiner for license to build a marine railway and extend his wharf on piles in Marblehead harbor in the town of Marblehead. Granted April 23, 1891.
1340. Petition of Augustus S. Messer for license to build a sea-wall and fill solid in Little harbor at Woods Holl in the town of Falmouth. Granted April 23, 1891.
1341. Petition of the Gloucester Gas Light Company for license to extend and maintain its wharf on piles, and to define the limits of its dock, in Gloucester harbor in the city of Gloucester. Granted April 23, 1891.
1342. Petition of Frederick W. Dickinson and others for approval of plans for building a bridge over the channel connecting north and south bays at Osterville in the town of Barnstable, as authorized by chapter 25 of the acts of 1891. Granted May 1, 1891.
1343. Petition of the board of County Commissioners of Barnstable County for license to rebuild and widen the bridge across Bump's River in the town of Barnstable. Granted May 1, 1891.
1344. Petition of the town of Hull for license to fill solid the bridge across the outlet of Marsh Pond in the town of Hull. Granted May 1, 1891.
1345. Petition of Edward F. Linton for license to build a sea-wall and fill solid on Weymouth Fore River in the town of Weymouth. Granted May 7, 1891.
1346. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a portion of section C of a main sewer in a creek flowing into Charles River in the city of Boston, as authorized by chapter 439 of the acts of 1889. Granted May 7, 1891.
1347. Petition of Lewis F. Buchanan and others, trustees, for license to build a pile pier in Nantucket harbor in the town of Nantucket. Granted May 14, 1891.
1348. Petition of Hannah F. Rogers for license to build dikes and flumes and to draw water from Cedar Pond and Pickerel Pond in the town of Wareham. Granted May 14, 1891.
1349. Petition of Rogers Brothers for license to extend their wharf on piles in Boston harbor at South Boston. Granted May 14, 1891.

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1350. Petition of Charles H. Jones for license to fill solid in Chapaquoit harbor in the town of Falmouth. Granted May 25, 1891.
1351. Petition of Franklin King and Charles H. Jones for license to build a breakwater and wharf in Chapaquoit harbor in the town of Falmouth. Granted May 28, 1891.
1352. Petition of Susie E. Trask and Horace W. Woodberry for license to widen their wharf by filling solid in Beverly harbor in the town of Beverly. Granted May 28, 1891.
1353. Petition of William O. Cutter for license to build a pile wharf in Buzzard's Bay at Monument beach in the town of Bourne. Granted May 28, 1891.
1354. Petition of the town of Falmouth for approval of plans for building a bridge across an arm of Chapaquoit harbor in the town of Falmouth, as authorized by chapter 61 of the acts of 1891. Granted May 28, 1891.
1355. Petition of the city of Salem for license to build masonry piers on North River at North Street bridge in the city of Salem. Granted June 4, 1891.
1356. Petition of Augustus J. Richards for license to build a sea-wall and fill solid on Weymouth Fore River in the town of Weymouth. Granted June 11, 1891.
1357. Petition of Augustus Hemenway for license to build a pile wharf in Beverly harbor in the town of Beverly. Granted June 18, 1891.
1358. Petition of the board of Metropolitan Sewerage Commissioners for approval of plans for building a sewer and siphon across Belle Isle Inlet in the city of Boston and town of Winthrop, as authorized by chapter 439 of the acts of 1889. Granted June 18, 1891.
1359. Petition of the Gloucester Electric Company for license to extend its wharf by filling solid in Gloucester harbor in the city of Gloucester. Granted June 22, 1891.
1360. Petition of Peleg McFarlin for license to build a dam and flume and draw water from Cedar Pond in the town of Carver. Granted June 22, 1891.
1361. Petition of the Roxbury Central Wharf for license to fill land and flats and build structures in South Bay in the city of Boston. Granted June 30, 1891.
1362. Petition of Grover Cleveland for license to build and maintain a wharf and float in Buzzard's Bay at Monument Neck in the town of Bourne. Granted July 2, 1891.
1363. Petition of William L. Bradley for license to build a wharf, partly solid and partly on piles, on Weymouth Back River in the town of Hingham. Granted July 2, 1891.

1364. Petition of Silas D. Fish for license to build a pile wharf in Provincetown harbor in the town of Provincetown. Granted July 9, 1891.
1365. Petition of the Boston Land Company for license to build a bulkhead or dike, fill flats and dredge a channel in Boston harbor at East Boston. Granted July 9, 1891.
1366. Petition of the North Packing and Provision Company for license to widen its wharf on piles on Miller's River in the city of Somerville. Granted July 9, 1891.
1367. Petition of Ethan A. Smith and Percy Parker, trustees, for license to build a pile wharf in Tyng's Pond in the town of Tyngsborough. Granted July 9, 1891.
1368. Petition of Ethan A. Smith and Percy Parker, trustees, for license to build a wharf and other structures in Tyng's Pond in the town of Dracut. Granted July 9, 1891.
1369. Petition of the Quincy Yacht Club for license to build a pile wharf, float, and a portion of a wooden building on Weymouth Fore River at Hough's Neck in the city of Quincy. Granted July 16, 1891.
1370. Petition of George G. Kennedy and others for license to fill land and flats and build structures in South Bay in the city of Boston. Granted July 16, 1891.
1371. Petition of the board of Park Commissioners of the city of Boston for approval of plans for building a pile bridge in Boston harbor between South Boston Point and Castle Island, as authorized by chapter 438 of the acts of 1889. Granted July 16, 1891.
1372. Petition of Silas D. Fish for license to build a pile wharf in Provincetown harbor in the town of Provincetown. Granted July 23, 1891.
1373. Petition of Mary G. Lamper and William A. Lamper for license to build a pile wharf and platform in Lynn harbor in the city of Lynn. Granted July 23, 1891.
1374. Petition of Lewis A. Roberts for license to build a stone and timber wharf in Mattapoisett harbor in the town of Mattapoisett. Granted July 23, 1891.
1375. Petition of the Union Wharf Company for license to drive piles for the support of a building in Boston harbor in the city of Boston. Granted August 13, 1891.
1376. Petition of the board of County Commissioners of Plymouth County for approval of plans for building a pile bridge across Duxbury harbor in the town of Duxbury, as authorized by chapter 301 of the acts of 1887. Granted August 13, 1891.

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1377. Petition of the Boston and Maine Railroad for license to build a stone culvert on Little River in the town of Newbury. Granted August 13, 1891.
1378. Petition of the Boston and Maine Railroad for license to build a stone culvert on Knight's Creek in the town of Newbury. Granted August 13, 1891.
1379. Petition of the city of Boston for license to build an addition to the draw-pier of the north draw of Chelsea bridge on Mystic River in the cities of Boston and Chelsea. Granted August 27, 1891.
1380. Petition of the Boston, Revere Beach and Lynn Railroad Company for license to replace its single-track bridge on Saugus River in the city of Lynn and town of Revere, by a double-track pile bridge with an iron pivot draw. Granted August 27, 1891.
1381. Petition of the town of Cohasset for the approval of plans for repairing and rebuilding the dam and flood-gates at Gulf Mill in Cohasset harbor in the town of Cohasset, as authorized by chapter 214 of the acts of 1891. Granted September 3, 1891.
1382. Petition of Warren S. Bumpus for license to excavate a canal and draw water from Dunham Pond in the town of Carver. Granted September 3, 1891.
1383. Petition of William F. Stanly for license to build a pumping station on piles, and to draw water from Dunham Pond in the town of Carver. Granted September 3, 1891.
1384. Petition of the board of County Commissioners of Essex County for license to build a pile and timber bridge across Parker River in the town of Newbury. Granted September 3, 1891.
1385. Petition of the Boston and Maine Railroad for license to build a stone culvert on Little River in the town of Newbury. Granted September 10, 1891.
1386. Petition of the Edison Electric Illuminating Company for license to fill solid on Fort Point Channel in Boston harbor. Granted September 17, 1891.
1387. Petition of Edward Perkins for license to fill solid on Merrimack River in the city of Newburyport. Granted September 17, 1891.
1388. Petition of William S. Coffin for license to fill solid on Merrimack River in the city of Newburyport. Granted September 17, 1891.
1389. Petition of Daniel Leach for license to build a pile wharf at Cheever's Point in Manchester harbor. Granted September 17, 1891.

1390. Petition of the town of West Springfield for license to build a sewer outlet on the Connecticut River in the town of West Springfield. Granted September 17, 1891.
1391. Petition of Andrew W. Dodd for license to build a sea-wall and fill solid in Gloucester harbor in the city of Gloucester. Granted September 17, 1891.
1392. Petition of Isaac C. Wyman for license to build a wharf by filling solid in Lynn harbor in the city of Lynn. Granted September 24, 1891.
1393. Petition of John L. Batchelder, trustee, for license to fill solid a portion of his pile wharf on Fort Point Channel in Boston harbor. Granted September 24, 1891.
1394. Petition of H. V. Partelow & Company for license to build a marine railway in Marblehead harbor in the town of Marblehead. Granted September 24, 1891.
1395. Petition of Frank M. Welles and others for license to build dikes and fill solid in creeks flowing into Crystal Cove in the town of Winthrop. Granted October 8, 1891.
1396. Petition of the Boston and Maine Railroad for license to build a stone culvert and fill solid on Malden River in the city of Malden. Granted October 8, 1891.
1397. Petition of the West End Street Railway Company for license to drive piles for the support of a building on Charles River in the city of Cambridge. Granted October 8, 1891.
1398. Petition of the city of Boston for license to rebuild the head-house foundation and a portion of the piers at the north ferry in Boston harbor at East Boston. Granted October 8, 1891.
1399. Petition of the East Boston Dry Dock Company for license to build a marine railway and extend its northerly pier in Boston harbor at East Boston. Granted October 15, 1891.
1400. Petition of Margaret Wade for license to build two pile wharves in Stage harbor and Oyster Pond River in the town of Chatham. Granted October 15, 1891.
1401. Petition of the Old Colony Railroad Company for license to fill solid a portion of its pile bridge on Weir River in the town of Hull. Granted October 15, 1891.
1402. Petition of the Old Colony Railroad Company for license to fill solid a portion of its pile bridge on Weir River in the town of Hingham. Granted October 15, 1891.

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1403. Petition of the Edison Electric Illuminating Company for license to fill solid on Fort Point Channel in Boston harbor. Granted October 22, 1891.
1404. Petition of John L. Batchelder, trustee, for license to fill solid on Fort Point Channel in Boston harbor. Granted October 22, 1891.
1405. Petition of Joseph Young and others for license to build a dike across Frostfish Creek in the town of Chatham. Granted October 22, 1891.
1406. Petition of the city of Boston for approval of plans for building a bridge across the reserved channel in Boston harbor at L Street in South Boston, as authorized by chapter 388 of the acts of 1891. Granted October 29, 1891.
1407. Petition of the Eastern Dredging Company for license to build a sea-wall, bulkhead and pile pier, and to fill solid on Chelsea Creek in East Boston. Granted November 5, 1891.
1408. Petition of the New England Dredging Company for license to build four dolphins in Boston harbor near the reserved channel at South Boston. Granted November 5, 1891.
1409. Petition of Martha A. Sargent for license to erect a spindle and place three moorings in Massachusetts Bay near Brant Rock in the town of Marshfield. Granted November 12, 1891.
1410. Petition of Albert S. Hathaway and George M. Besse for license to build a dike, flume and canal, and to draw water from Five Mile Pond in the town of Plymouth. Granted November 12, 1891.
1411. Petition of Augustus M. Nickerson for license to build a dike, flume and canal, and to draw water from Long Pond in the towns of Plymouth and Wareham. Granted November 12, 1891.
1412. Petition of the Edison Electric Illuminating Company for license to build a pile wharf on Fort Point Channel in Boston harbor. Granted November 19, 1891.
1413. Petition of the Gloucester Electric Company for license to build a pile wharf in Gloucester harbor in the city of Gloucester. Granted November 19, 1891.
1414. Petition of Charles C. Cobleigh, trustee, for license to extend his wharf on piles on Charles River in the city of Boston. Granted November 19, 1891.

1415. Petition of the West End Street Railway Company for license to dump snow and ice from bridges and wharves into tide waters in the cities of Boston, Cambridge and Chelsea, and the town of Medford. Granted November 19, 1891.
1416. Petition of the Union Freight Railroad Company for license to dump snow and ice from Constitution Wharf into Boston harbor. Granted December 3, 1891.
1417. Petition of the West End Street Railway Company for license to extend its wharf on piles on Miller's River in the city of Cambridge. Granted December 3, 1891.
1418. Petition of F. J. C. Swift for license to build a shooting stand in Buzzard's Bay at Gunning Point in the town of Falmouth. Granted December 3, 1891.
1419. Petition of Dexter J. Cutter for license to drive piles for the support of a building on Mill Creek at Commercial Point in the city of Boston. Granted December 10, 1891.
1420. Petition of the Walworth Manufacturing Company for license to extend its wharf by filling solid in Boston harbor near the reserved channel at South Boston. Granted December 10, 1891.
1421. Petition of Dexter J. Cutter for license to extend his wharf on piles on Mill Creek at Commercial Point in the city of Boston. Granted December 10, 1891.
1422. Petition of the city of Boston for license to relocate and extend the fender guard at the north draw of Chelsea bridge on Mystic River in the city of Boston. Granted December 10, 1891.
1423. Petition of the city of Boston for license to widen the wharf, on piles, at the North ferry in Boston harbor at East Boston. Granted December 10, 1891.
1424. Petition of the town of Winthrop for license to fill solid a portion of Washington Avenue bridge in Crystal Cove in the town of Winthrop. Granted December 17, 1891.
1425. Petition of the city of Cambridge for license to build a pile bridge on Broad Canal in the city of Cambridge. Granted December 31, 1891.
1426. Petition of John P. Squire & Company for license to build a pile wharf and well on Miller's River in the city of Cambridge. Granted December 31, 1891.

RECEIPTS FROM GRANTS OF PUBLIC LANDS.

The amount received during the past year for grants of rights and privileges in lands of the Commonwealth, under licenses of this board for filling and for the erection of wharves and other structures in and over tide waters and great ponds, is \$3,206.80. Other like assessments to the amount of \$5,135.40 have been made during the year, for which the money has not yet been paid into the treasury. Payment for such grants was first required by chapter 284 of the acts of 1874, now chapter 19, section 16, of the Public Statutes. Since the passage of that act, the total amount so received and paid into the State treasury has been \$278,101.40.

HARBOR IMPROVEMENTS BY THE UNITED STATES.

The works of the national government for the preservation and improvement of the rivers and harbors on the coast of Massachusetts, have remained under the supervision of the same able and efficient officers of the Corps of Engineers, U. S. Army, who had charge of them at the date of our last Report, — those on the Eastern section of the coast in charge of Lieut. Col. Samuel M. Mansfield, who is stationed at Boston, and those on the Southern section in charge of Maj. William R. Livermore, whose headquarters are at Newport.

To both of these gentlemen, as to their predecessors, this board is indebted for courteous coöperation, and the public for valuable service.

Since the close of the last fiscal year of the United States, ending June 30, 1891, Capt. William H. Bixby, Corps of Engineers, U. S. Army, has, by order of the Chief of Engineers, assumed the charge of the rivers and harbors on the Southern section of the coast.

Improvements on the Eastern Coast of Massachusetts.

At the request of the Board, Colonel Mansfield has kindly furnished the following condensed report of the work done in the rivers and harbors under his charge during the year 1890:—

UNITED STATES ENGINEER OFFICE,
BOSTON, MASS., December 30, 1891.

The Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN :—In accordance with your request of this date, I have the honor to furnish the following summary of the work done by the Government during the year in those rivers and harbors of Massachusetts which are under my charge :—

1. *Newburyport Harbor.*

The general project for the improvement of this harbor has not been changed.

The south jetty and the dike closing Plum island basin, are in the same condition as at the date of my last report.

In the north jetty, during the year, 11,445 tons of rubble stone were deposited, under a contract with Mr. J. H. White, and the full section of this jetty is now 2,485 feet long.

A survey was made of the entrance bar during June, 1891, and at that date the least depth on the bar in a channel at least 300 feet wide, was 12 feet.

2. *Harbor of Refuge, Sandy Bay, Rockport.*

During the year 120,573 tons of rubble stone were deposited in the breakwater, under a contract with the Rockport and Pigeon Hill granite companies, and its sub-structure is now essentially completed between cross ranges 140 and 4,700.

3. *Gloucester Harbor.*

No change has been made in the project for the improvement of this harbor.

During the year 47,298 cubic yards were dredged from Harbor Cove and the main harbor, under a contract with the Bay State Dredging Company.

The channels in Harbor Cove are now each 140 feet wide and 10 feet deep at mean low water, and the main harbor has been improved as projected from the entrance near Fort Point to the steamboat wharf; and 15 feet at mean low water can now be carried thus far.

4. *Manchester Harbor.*

No change has been made in the project for the improvement of this harbor.

During the year 22,052 cubic yards were dredged from the harbor, under a contract with Messrs. Hamilton & Sawyer, and at the date of this report 4 feet at mean low water can be carried to the railroad bridge in a channel 40 feet wide.

5. Salem Harbor.

Operations in this harbor were in progress during the year under a contract with Mr. Augustus R. Wright. At the date of this report, 8 feet at mean low water can be carried to near the head of Derby wharf, in a channel 70 feet wide; thence, to the head of navigation in South River, the proposed improvement has been completed. The improved channel is 6 feet deep, 50 feet wide.

A small ledge was uncovered by the dredging near Derby Wharf light, and it is proposed to remove this ledge with the funds now available for this harbor.

6. Lynn Harbor.

During the year 44,819 cubic yards were dredged from the anchorage basin near the city wharves, thus completing it as proposed.

A survey of the channel through the outer bar, which was dredged in 1885, was made during the year, and it showed that the channel had retained its full depth and width as originally dredged; and therefore the training wall which is projected to aid in keeping this channel open, has not yet been proved to be necessary.

7. Winthrop Harbor.

A channel 35 feet wide, 3 feet deep at mean low water, was dredged from deep water to opposite Rice's wharf, under a contract with Boynton Bros., who removed 20,060 cubic yards in effecting this improvement.

8. Boston Harbor.

Repairs were made to the sea-wall at Great Brewster island; the sea-wall at Gallop's island was extended 345 feet to the southwest; and the rip-rap protecting the south shore of Long island was extended to the west about 250 feet.

The main ship channel at the western end of Brewster Spit was enlarged to its full dimensions, 625 feet wide, 23 feet deep at mean low water, by the removal of 28,510 cubic yards of gravel, under a contract with Mr. Augustus R. Wright.

The channel between Nix's Mate and Long island was enlarged and deepened, under a contract with the New England Dredging Company. During the year 60,000 cubic yards were removed from this channel, and, at the date of this report, it is 250 feet wide, 15 feet deep at mean low water.

The main ship channel was extended from near the Grand Junction wharves to Jeffrey's Point, under a contract with Mr. Augustus R. Wright. During the year 80,000 cubic yards were removed under this contract, and this part of the channel is now 200 feet wide, 18 feet deep, opposite Grand Junction wharf, and 15 feet deep opposite Jeffrey's Point.

Proposals have been invited to widen the main ship channel at the Upper Middle, so far as can be effected by the expenditure of \$40,000; and this work will be done early in the coming year.

No progress has been made in the improvement of the upper Charles River, for which funds were provided by the last river and harbor bill, for the reason that the terms of the act, which require alterations in the bridges crossing this part of the river, have not been complied with.

The Nantasket beach channel was widened so that it is nowhere less than 150 feet wide, $9\frac{1}{2}$ feet deep at mean low water, except over a small ledge uncovered by the dredging near the steamboat wharf.

9. *Hingham Harbor.*

The improved channel in this harbor is now at least 100 feet wide, and 10 feet deep, at mean low water. 20,400 cubic yards were removed under a contract with Mr. Augustus R. Wright, and the project for its improvement has been completed, except the removal of a mid-channel ledge near Chandler's island.

10. *Scituate Harbor.*

The channel connecting the anchorage basin with the town wharves was widened to 100 feet, and deepened to 3 feet, at mean low water, under a contract with Mr. Augustus R. Wright. 30,000 cubic yards were dredged.

11. *Plymouth Harbor.*

The anchorage basin was completed, and the improved channel widened to 130 feet, under a contract with the National Dredging Company. 18,594 cubic yards were dredged, and the project for the improvement is essentially completed.

Repairs and extensions were made to the bulkheads protecting Long Beach.

12. *Wellfleet Harbor.*

No operations were in progress in this harbor during the year, as the expenditure of the funds available for it would not produce any appreciable benefit to navigation and commerce.

13. Provincetown Harbor.

The breakwater protecting the east end of Long Point was extended 200 feet to the northward, to more fully protect this part of the beach.

A bulkhead 2,000 feet long was built west of Wood End light, to strengthen this weak part of Long Point.

14. Chatham Harbor.

A channel 100 feet wide and 6 feet deep at mean low water, was dredged through the middle and inner bars, under a contract with Mr. Charles W. Anthony. 8,714 cubic yards were removed, and at least 5 feet draft at mean low water can now be carried over the outer bar and into the harbor.

15. Merrimack River.

No work has been done during the year.

The funds available are applicable only to Mitchell's Falls, and no benefit to navigation would result from their expenditure.

16. Powow River.

The funds available can only be expended after a draw has been built in the bridge crossing the river, and as yet notice has not been received at this office that such has been constructed.

17. Ipswich River.

No work has been done during the year, as the funds available will not complete the project, and its partial completion would result in no benefit to navigation.

18. Weymouth River.

Under a contract with Mr. Augustus R. Wright, 23,974 cubic yards were dredged from this river, resulting in making a channel 6 feet deep at mean low water, 40 feet wide, to Braintree bridge, and 25 feet wide above the bridge to the head of navigation.

Very respectfully,

S. M. MANSFIELD,
Lieut. Col. of Engineers.

Improvements on the Southern Coast of Massachusetts.

The Board is indebted to the courtesy of Captain Bixby for a copy of the official report of the work done under his predecessor in the rivers and harbors now under his charge, during the fiscal year ending June 30, 1891, from which the following facts are taken:—

1. Hyannis Harbor.

The improvement consists in enlarging by dredging the 15½-foot anchorage ground protected by the breakwater. During the last fiscal year 22,100 cubic yards were dredged, and about 4 acres added to the 15½-foot area.

The balance available July 1, 1891, \$2,015.00, will be applied to the continuance of this work.

2. Nantucket Harbor.

The approved project is the construction of jetties of rip-rap stone projecting from either side of the entrance to the harbor.

Congress appropriated \$25,000 for this improvement in 1890, but owing to the failure to make satisfactory contracts, work did not begin until a few days before the close of the fiscal year, when 300 tons of stone were being delivered daily by hired labor.

Balance available for the work July 1, 1891, \$14,615.00.

3. Edgartown Harbor.

It is proposed to excavate the middle ground of the inner harbor to a depth of 10 feet at mean low water.

No work was done during the last fiscal year. No bids had been received for contract work, and it was proposed to employ hired labor.

Balance available July 1, 1891, \$1,754.

4. Vineyard Haven Harbor.

The plan of improvement contemplates the protection of the chops from the action of the storm waves, by the construction of jetties and other works along the shore.

The last fiscal year a stone jetty was extended 1,150 feet on the East chop, and a longitudinal wall 80 feet long was built on the West chop. 1,064 tons of stone were placed in the work. It is proposed to continue the work, mainly at the East chop.

Balance available July 1, 1891, \$6,076.

5. *Wareham Harbor.*

The approved project provides for the improvement of the channel and the building up of Long Beach. No work was done the last fiscal year.

Amount available July 1, 1891, \$2,493.93.

6. *New Bedford Harbor.*

The plan of improvement contemplates the excavation of a channel of approach to the wharves at New Bedford, 18 feet deep at mean low water. No work was done the last fiscal year.

Balance available July 1, 1891, \$7,031.67.

7. *Westport Harbor.*

The improvement consists in the construction of jetties at the end of Horse Neck Point to prevent its wearing away, and dredging on the Lion Tongue shoal. No work was done the last fiscal year.

Balance unexpended July 1, 1891, \$977.04.

8. *Taunton River.*

The approved project, which has been nearly completed, consists in the widening and deepening of the channel, and the removal of ledges and bowlders from its bottom and sides.

Dredging was begun just before the close of the last fiscal year, and the first reach and a portion of the second reach above Berkley bridge, were completed.

Balance available July 1, 1891, \$2,748.50.

PROTECTION OF ISLANDS IN BOSTON HARBOR.

The importance of preventing the further wasting of the islands and headlands in Boston harbor from the action of winds and waves and other causes, is well understood. The removal from them of gravel and other material for sale or use elsewhere, needs watchful oversight. The only statute on the subject was passed in 1856, before this Board was established. It is recommended that its powers and duties in respect to Boston harbor be made similar to those which have been provided in the case of other harbors and beaches of less importance.

BUOYS FOR YACHTS AND SMALL BOATS.

The Board was directed by chapter 105 of the Resolves of 1891 "to make an investigation and report to the next General Court such plan or plans as seem to them feasible for marking dangerous rocks and bars in the harbors of the Commonwealth in such a way as to secure greater safety to yachts and small boats;" and to "state particularly in their report the expense of carrying out any plans recommended by them."

We have undertaken and made some progress in this investigation. The resolve was passed late in the session, and our purpose to avail ourselves of the information and suggestions of yachtsmen and others interested at public hearings later in the year, has been defeated by the lengthy investigation of the subject of the East Boston bridge, and other somewhat unusual demands upon our time.

There are 42 harbors within the limits of the State in which the national government maintains aids to navigation.

In order to ascertain the number and location of rocks and bars in these harbors which are considered dangerous to yachts and small boats, and which are not marked, interviews have been had with yachtsmen and others familiar with the principal harbors, and numerous places have been visited.

In nine of these harbors 56 places have been suggested as requiring buoys or marks, including 27 places in Boston harbor. In five other harbors, no places have been suggested. In Marblehead harbor, for instance, though much frequented by yachts, the water is deep, and it is said that the rocks and dangerous places are already marked by the national government.

Some attention has also been given to the manner of marking dangerous rocks and bars according to location and depth of water. A buoy which would stand the year round in a channel whose currents keep it free from ice, would be torn away in the shoaler waters of a bay which freezes over in the winter; and the buoy in the latter case must be of such character that it can be conveniently taken up before cold weather and replaced in the spring.

The United States has a system established by public statute for coloring and numbering buoys, so that each has its definite and well-understood meaning. How far it would be necessary to have a uniform system for buoys and marks such as are proposed, and whether that system should be like or quite unlike the national system, may also require consideration.

The approximate cost of 50 spar buoys not exceeding 30 feet in length, as per specifications of the United States Light House Board, including the setting of the same if set in Boston harbor, is estimated at \$2,000. The cost of other buoys and marks cannot be estimated until their character is settled upon.

What has been said suggests rather than answers some of the questions to which this interesting subject gives rise, and makes it apparent that more time is required for its proper investigation. It is the purpose of the Board to continue such investigation and to make further report to the next General Court.

CONNECTICUT RIVER.

The "general care and supervision of the Connecticut River within the confines of this Commonwealth, and of the banks thereof, and of all structures therein," were committed to this Board by chapter 344 of the Acts of 1885. Its attention, and the time of its engineering force, are occupied more and more year by year with the duties and work imposed by this statute.

River Bank at Springfield.

Mention was made in our last report of injurious encroachments on the river along its bank in the city of Springfield. Notice was also received from the city the past year of its desire to extend sewer outlets into the river, with the request that the Board would prescribe the limit of extension and manner of construction.

Partly with reference to this application, and partly with a view to obtaining a record of the present position and con-

dition of the river bank, and also the data for establishing a "harbor" or limit line beyond which no structure or filling shall hereafter be allowed, the survey and plans described on a preceding page of this report, covering the main frontage of the city and the opposite bank for a distance of nearly a mile and three-quarters, have been made the past year.

River Bank at Hadley.

The selectmen of Hadley called our attention the last autumn to the rapid wearing and caving of the river bank in that town along the North Hadley road, so that another year the road would probably have to be re-located farther back from the river. They also expressed the fear that the river might in course of time work in from above back of the protective works built a few years since under a grant of the Legislature, and again endanger the village of Hadley.

The survey mentioned on a preceding page was accordingly made with a view to obtaining a record of the present position of the river bank, and thereby determining by comparison with future surveys the progress of the invasion of the river; and, if found necessary, checking it in season to prevent injury to the protective works and danger to the village.

Protective Works at West Springfield.

Provision was made by chapter 90 of the Resolves of the last year, for the expenditure of \$5,000 under the direction of this Board for protective works "to prevent the further inroads of the Connecticut River upon the easterly side of the town of West Springfield and the destruction of property in said town."

After preliminary examinations and surveys, the work was taken in hand, and has been executed on substantially the same plan and by the same methods as were adopted at Hadley with, so far as now appears, entire success.

The work was done under the immediate supervision of Messrs. E. C. and E. E. Davis, of Northampton, civil

engineers, who also superintended the construction of the protective works at Hadley under our direction. They make the following report : —

To the Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN : — We have the honor to submit the following report and summary of the work done under our supervision for the protection of the town of West Springfield against the further encroachments of the Connecticut River, under the provisions of chapter 90 of the Resolves of 1891.

Preliminary surveys for the proposed work were made in June last; and a plan of that part of the river and its banks lying between the Boston & Albany railroad bridge on the north and the old toll bridge on the south, together with profiles of the bed of the river on its cross sections, was submitted to your Board for consideration, with recommendations for the proposed work.

These profiles showed that the channel or thread of the river ran diagonally across its bed in a south-easterly direction from the westerly abutment of the railroad bridge to the easterly end of the old toll bridge below.

The greatest encroachment of the river on the West Springfield side was found to be immediately below the southerly line of the location of the Boston & Albany railroad. The scouring and receding of the bank had there reached the foot of the dike which had been built along the bank of the river for the protection of public highways and private property, endangering the permanency of that structure, as well as that of others on the bank below.

The method adopted for treating this reach of the river bank in order to prevent further encroachments upon the dike, was similar in kind to the work done under your direction on the river bank in the town of Hadley, in the years 1889 and 1890; but the construction was somewhat heavier, with overlapping rip-rap work instead of rubble above the low water line and up the slope to the foot of the dike.

The setting of willows on the slope above the low water line, as was done on the Hadley bank, has been omitted here, the river bank at this place being used largely as a boat landing and also for hauling ice from the river to the ice houses abutting on the dike.

Proposals for furnishing the stone for the work were invited by public advertisement, and the contract was awarded to William P. Latham, of Northampton, at the price of two dollars and ninety

cents (\$2.90) per cubic yard, he being the lowest bidder. The amount of stone delivered by him was 903 cubic yards, under substantially the same specifications as for the Hadley work before referred to.

All other parts of the work have been done by the day under our immediate supervision. The brush and poles for the mats were procured near the mouth of the Agawam River, about three-fourths of a mile below the work, and were brought up on scows.

The number of square yards of mats laid, with the overlying rip-rap work, is 3,570, extending 205 feet in length on the river front at low water, with the down-stream end of the submerged part of the work finished at the angle with the river front shown on the plan.

The foot or outer end of the mats rests on a bar of hard gravel, well adapted to resist the tendency of the current to undermine the work.

The three scows used at this place were the same as those used at Hadley. Upon the completion of the work they were sold to the Springfield Canoe Club, with the poles, lumber, tools, etc., for the sum of one hundred and twenty-five dollars (\$125.00).

The work we consider an ample protection against further encroachments of the river at this place.

We recommend that the selectmen of the town of West Springfield be authorized to have the general oversight and control of the work, to the extent of preventing any disturbance of it by artificial structures built in or upon it and tending to impair its stability.

All bills incurred by us have been paid, and we know of no unsettled claims against the State having their origin in any action of ours in the execution of this work.

The total amount of the expenditures incurred under our direction, of which we have furnished you from time to time detailed statements with vouchers, has been \$4,877.89. Deducting the sum of \$125.00 received from the sale of the scows, etc., as above stated, the net cost of the work of construction has been \$4,752.89.

Respectfully submitted,

E. C. DAVIS,

E. E. DAVIS,

Engineers.

NORTHAMPTON, MASS., November 5, 1891.

It is due to the Messrs. Davis to say that this work, as well as that at Hadley, has been conducted by them with

skill, good judgment and economy, with careful attention to our directions, and to our entire satisfaction. We also take pleasure in stating that in both cases the work has been thoroughly done at a cost less than the appropriation by the General Court.

The foregoing Report is respectfully submitted.

JOHN E. SANFORD.
JOHN I. BAKER.
CHARLES H. HOWLAND.

Boston, January 1, 1892.

APPENDIX.

APPENDIX.

[A.]

[See page 35 of this Report, *ante*.]

GROWTH OF THE FOREIGN STEAMSHIP COMMERCE OF THE PORT OF BOSTON.

By WILLIAM H. LINCOLN, OF BROOKLINE, MASS.

I should say that the development and increase of the foreign steamship business of the port of Boston began about the year 1875, when it was publicly announced that three steamers had been engaged to run regularly between this port and Liverpool. This was the beginning of what is now known as the Leyland line.

These steamers were the *Iberian*, *Istrian*, and *Illyrian*. For many years previously the Cunard line had maintained weekly sailings from this port for passengers and freight; but its steamers were of small capacity, and did not accommodate the growing business of the port. Many of our importers were obliged to ship their goods *via* New York; and, as an illustration of the greater competition and increase in business, it may be stated that the rates of freight from Liverpool are now about one-fifth of what was charged at that time.

The Warren line had also started in the business, but no regular sailings had been established. The Dominion line had also made this a winter port, and provided one sailing a fortnight. The first year of the Leyland line, the three steamers already mentioned afforded fortnightly sailings. The result was so satisfactory that three more steamers were added the following year, providing weekly sailings. There did not exist at that time any line of steamers to any other foreign port; and the sailings averaged about two steamers a week for Liverpool. That was the extent of our foreign steamship commerce.

It may be interesting to know that in this same year 1875, the first shipment of live cattle was made, by the steamer *San Marcos*, which took 150 head only. To show the development of this branch of the trade, it may be stated that during the five months ending November 30, 1891, there were shipped from this port 45,000 head of cattle. The shipment of fresh meat was also at that time unknown; whereas there were shipped from this port during the month of November last, over 5,000,000 pounds of fresh meat.

The shipment of cotton, which contributes now so largely to the cargoes of all our steamers for Liverpool, was then in its infancy, and the business had not developed in this port. In fact, there was no cotton brought here by rail for shipment to Europe, and the first efforts were made to bring cotton by the Baltimore steamship line from Norfolk. To show how this trade has increased, there were shipped from this port, during the month of November last, over 30,000 bales of cotton, and this will be largely increased the present month. The steamer *Lancastrian* of the Leyland line, which sailed last week, took over 5,000 bales, and this line had nearly 60,000 bales at one time under contract to transport.

In order to show more completely the enormous growth of our foreign steamship commerce, it will suffice to say that there are eighteen sailings to Liverpool alone the present month, eight sailings to London, four to Glasgow, and three to Hamburg and Antwerp. It will be noticed that this makes more than one sailing daily.

This alone does not indicate the enormous growth of our business, for it should be added that the steamers now employed are about double the capacity of those that were formerly engaged in the trade. For example, the first steamers of the Leyland line had a capacity of 2,500 tons weight, or 4,000 tons measurement. The present steamers carry 5,000 tons weight, or 8,000 tons measurement; so that not only have the number of sailings more than quadrupled, but the steamers have a capacity for more than twice the amount of cargo.

This vast increase can hardly be appreciated by those who are not familiar with the business. The enormous traffic constantly employs thousands of railway cars, and large docks have been constructed to accommodate the growing business.

The cargoes that these steamers bring from Europe are mostly consigned to our own merchants for distribution from this port. All our manufacturing industries have derived great benefit from this increase, and from the competition which has resulted in lower rates of freight.

The outward local business has also kept pace with the increased facilities, and the shipments of provisions, apples, leather, woodenware, organs, and other manufactured articles, indicate the growth and prosperity of this branch of the trade.

There seems to be no reason why this business should not grow in the future, though at present the ground seems to be fully occupied. One would not have dared to predict twenty years ago the vast increase that has since taken place.

Neither can we imagine the disastrous results that would follow any serious interruption of this business. It would be the height of folly for the city of Boston to sanction or allow any measures that would interfere with the foreign commerce of the port; for no one can comprehend the results that would ensue in all important branches of trade.

Rather should we seek to extend our facilities, and provide additional accommodations for a still larger commerce.

[B.]

[See page 38 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS SEVENTH DAY OF MAY, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-ONE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND WILLIAM MILLER, OF BOSTON, IN THE COUNTY OF SUFFOLK AND COMMONWEALTH AFORESAID, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work and other things specified and described in the following specifications for building a bulkhead on the South Boston Flats, in Boston harbor, all of the same to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth : —

Specifications.

Said party of the second part is to furnish all the plant, tools, appliances, labor and materials necessary to build 1,345 lineal feet of bulkhead on the South Boston Flats, located between the letters A-B and B-C on a plan on file in the office of the Board of Harbor and Land Commissioners, entitled "*Plan of Proposed Bulkhead on north side of 190-acre lot, South Boston Flats. April 20, 1891.*"

The style and manner of construction of the bulkhead are shown on the same plan on a scale of 2 feet=1 inch.

Said plan is made a part of these specifications, and is to be followed in all details shown thereon, though not specially mentioned herein.

The piles to be driven six feet apart on centres.

Three stringers of spruce timber, one 6" x 8", and the other two 6" x 10" each, to be bolted on the face of the piles.

The planking to be of 3-inch spruce plank, placed vertically,

driven at least two feet into the earth bottom, and well spiked to the stringers with $\frac{3}{4}$ -inch wrought iron ship spikes 7 inches long, and cut off level with the top of the highest stringer.

The planking to be still further secured by two battens of 3" x 6" spruce, bolted through to the two upper stringers every six feet, with extra bolts at the joints.

The bulkhead to be supported by fitting a 6" x 10" spruce stringer on the back of the piles of the new bulkhead $2\frac{1}{2}$ feet below their tops, and connecting this stringer through each pile by 1 $\frac{1}{4}$ -inch iron rods with a similar stringer placed behind the spurshore piles of the old bulkhead at the level of the flats, except for a distance of 150 feet as below; the whole to be fitted and constructed as shown in detail on said plan. In addition to the above, the stringers to be secured to the piles by $\frac{3}{4}$ -inch spike bolts not less than 15 inches long.

For a distance of about 150 feet between the letters D-E on said plan, instead of placing the stringer behind the spurshore piles of the old bulkhead, it is to be buried in the present filling at grade 8, on a line 18 feet south of and parallel with the line of the new bulkhead.

The piles to be of spruce, straight, sound and free from large knots, and not less than 10 inches in diameter at the butt when cut off, and not less than 6 inches in diameter at the point when ready for driving,—all measurements to be made under the bark,—and to be driven at least 12 feet into the hard clay; and all those injured in driving to be removed and replaced by perfect ones at the expense of the contractor.

The piles to be driven on a true line, so that the stringers may be put on full size without excessive cutting of the piles.

The piles to be cut off at grade 15, and the top stringer to be put on flush with the top of the piles, and the others as shown on plan, and bolted to the piles with 1" screw bolts.

The stringers to be in as long lengths as can be obtained, none less than 15 feet; joints to be spliced with pieces of the same not less than 3 feet long, and each splice fastened with four $\frac{3}{4}$ -inch screw bolts, all as shown on plan.

Angles in the bulkhead to be further strengthened by bolting stringers together where they meet, and by connecting the two piles nearest the angle by three 1 $\frac{1}{4}$ -inch screw bolts, as directed by the engineer.

The new work to be securely connected at the ends with the present bulkheads.

All planking and timber to be of spruce, sawed square, straight, sound, and free from large knots.

All iron work to be of best double refined wrought iron, satisfactory to the engineer.

In building the bulkhead in front of the lot leased to John Crowley, and in front of the lot and through the pier leased to Thomas Cargill, the work to be conducted so as to cause as little inconvenience to said Crowley and Cargill as is practicable.

At the intersection of the bulkhead with the trestle leading to the elevating station of the New England Dredging Company, such opening to be left through the upper portion of bulkhead as will, in the opinion of the engineer, allow free use of said trestle by said company, and the work to be conducted so as not to interfere with the use of said trestle.

In all questions which may arise concerning measurements, lines and grades, the decision of the engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by said party of the second part at his own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of the engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of the engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

The work to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; and to be fully completed on or before the thirty-first day of July, 1891.

Upon the completion of the work, said party of the second part to remove all of his plant and appliances, and to leave the premises in a condition satisfactory to the engineer.

Estimates to be made by the engineer of the amount of work done up to the end of each calendar month, and payment to be made thereon of 90 per centum of the proportional part of the whole contract price applicable to such work, as computed by the engineer; and the remaining 10 per centum to be paid upon the final completion of the whole work.

If said party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from any breach thereof.

The word "engineer" as used herein means the engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

The word "grade" means the grade above mean low water in

Boston harbor, as fixed and used by the engineer in the work of improvement on the South Boston Flats.

And said party of the first part, in consideration of the performance and completion of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay said party of the second part the sum of five thousand four hundred and eighty-nine dollars (\$5,489) ; the same to be in full compensation for all the work and other things done, furnished, performed and completed as aforesaid, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council ; and the said William Miller has hereunto set his hand and seal.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

WM. MILLER.

[SEAL]

Witness, FRANK W. HODGDON to W. M.

In Council, May 13, 1891. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

WM. M. OLIN, *Secretary.*

[C.]

[See page 38 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS SIXTEENTH DAY OF APRIL, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-ONE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND GEORGE H. CAVANAGH, OF BOSTON, IN THE COUNTY OF SUFFOLK AND COMMONWEALTH AFORESAID, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to furnish all the materials and to do and complete all the work specified and described in the following specifications for repairing a wooden bulkhead on South Boston Flats, all of said materials to be furnished and all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth : —

Specifications.

The said party of the second part is to furnish all the plant, tools, appliances, labor and materials necessary to repair 1,435½ lineal feet of bulkhead on the South Boston Flats, located between the letters A-B and B-C on a plan on file in the office of the Board of Harbor and Land Commissioners, entitled “Plan of the portion of South Boston Flats proposed to be filled, March, 1889. Scale 2400,” and to put said bulkhead in as good condition as when first built.

All the work and materials, except as otherwise herein expressly provided, to conform to the “Specifications for building a Wooden Bulkhead on South Boston Flats,” dated April 1, 1889, a copy* of which is hereto annexed, and which are referred to and made a part hereof.

* The specifications referred to are printed in the Report for 1889, Appendix F. page 63, and are here omitted.

About 100 new piles from 45 to 50 feet long will be required, and about 500 feet of the stringers and planking will require rebuilding.

The old material now in the bulkhead to be used only when it is uninjured and suitable in all respects, and new material to be furnished to complete the work.

Nearly all of the spurshores in the 1,435½ feet will require to be refitted or replaced with new ones. Where the heads of the spurshores are split, but otherwise in good condition, the split portions to be bolted together with two $\frac{3}{4}$ " screw bolts, one above and one below the main spurshore bolt.

In addition to the work above described, the bulkhead to be strengthened by cutting the heads of the upper spurshores level, trimming their sides square at the top, and fitting on top of them a 6"x10" spruce stringer, notched down 2" on the tops of the spurshores, fitted into notches in the main piles, and bolted into each main pile by one 1½" screw bolt, all as shown in red on a plan of said bulkhead forming a part of said specifications of April 1, 1889. The stringers to be in as long lengths as possible, and to be spliced in the same manner as the other stringers.

The statements herein made as to the amount of work and material required to repair said 1,435½ feet of bulkhead, are believed to be correct; but the party of the second part must examine for himself, as no allowance will be made for any inaccuracies which may be found therein, or for any additional work or materials which may be found necessary in the due execution of the contract, or for any further loss or damage which may occur before the completion of the work.

In all questions which may arise concerning measurements, lines and grades, or the use of old materials, the decision of the engineer of said Board to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by the party of the second part at his own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of said engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of said engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

The work to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; and to be fully completed on or before the thirty-first day of July, 1891.

Estimates to be made by said engineer of the amount of work

done up to the end of each calendar month, and payment to be made thereon of 90 per centum of the proportional part of the whole contract price applicable to such work, as computed by said engineer; and the remaining 10 per centum to be paid upon the final completion and acceptance of the whole work.

If the party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from any breach thereof.

engineer" as used herein means the engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay said party of the second part the sum of thirty-three hundred (3,300) dollars, the same to be in full compensation for all the work and other things done, furnished, performed and completed as aforesaid, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council; and the said George H. Cavanagh has hereunto set his hand and seal.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

GEO. H. CAVANAGH.

[SEAL.]

In Council, May 6, 1891. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

WM. M. OLIN, *Secretary.*

[D.]

[See page 39 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS TWENTY-FIFTH DAY OF JUNE, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-ONE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND THE NEW ENGLAND DREDGING COMPANY, A CORPORATION DULY ESTABLISHED UNDER THE LAWS OF SAID COMMONWEALTH, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work specified and described in the following specifications for filling a portion of the South Boston Flats, all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth:—

Specifications.

The party of the second part is to furnish all the plant, tools, appliances, labor and materials necessary for filling, as hereinafter specified, a strip about 1,000 feet long and 30 feet wide along the rear of the sea-wall on the northerly side of the reserved channel on the South Boston Flats.

The exact length along the line of the sea-wall to be determined by the engineer as the work proceeds.

The width of 30 feet to be measured from the rear line of the sea-wall on grade 13.

The dredged filling material to be allowed to take its natural slope, not exceeding *five to one*, beyond the 30-foot line.

After the dredged material has been deposited, a trench 3 feet wide to be excavated immediately in rear of the sea-wall down to the stone back ballast already in place, and to be refilled with fine chip stone ballast.

The dredged material, including that excavated from the trench, and the stone ballast in the trench to be left level at grade 13.

The dredged material for filling to be obtained by dredging from

the reserved channel west of Harrison Loring's wharf, at such place or places as may be designated by the engineer, and to a uniform depth of 12 feet below mean low water.

Special care to be taken not to disturb the sea-wall in any way; and if any stones are displaced, they are to be reset by the party of the second part at its own expense.

In all questions which may arise concerning measurements, lines and grades, the decision of the engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by the party of the second part at its own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of the engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of the engineer, and with such machinery and appliances, and by such methods, and in such order, as shall be approved by him, and to the acceptance of said Board.

Upon the expiration of the contract, the party of the second part to remove all of its plant and appliances, and to leave the premises in a condition satisfactory to the engineer.

The work to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; and to be fully completed on or before the thirty-first day of August, 1891.

Estimates to be made by the engineer of the amount of work done up to the end of each calendar month, and payment to be made thereon of 75 per centum of the proportional part of the whole contract price applicable to such work, as computed by the engineer; and the remaining 25 per centum to be paid upon the final completion and acceptance of the whole work.

If the party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties without prejudice to its claim for damages arising from any breach thereof.

The word "engineer" as used herein means the engineer of the Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

The words "party of the second part" mean the corporation contracting to do the work, or its agent in immediate charge of the work.

The words "grade 13" mean the horizontal plane 13 feet above mean low water in Boston harbor, as fixed and used by the engineer in the work of improvement on the South Boston Flats.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of thirty-nine and one-half ($39\frac{1}{2}$) cents per cubic yard of dredged and ballast material measured in the fill, after such material has been deposited and levelled as hereinbefore described ; said sum to be in full therefor, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council ; and the said New England Dredging Company, by Charles H. Souther, its president and treasurer, thereunto duly authorized, has caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

NEW ENGLAND DREDGING COMPANY,

By CHARLES H. SOUTHER, [SEAL OF THE NEW ENGLAND
DREDGING CO.]
President and Treasurer.

In Council, July 1, 1891. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

WM. M. OLIN, *Secretary.*

[E.]

[See page 41 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS TWENTY-EIGHTH DAY OF MAY, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-ONE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND GEORGE H. KEYES, OF BOSTON, IN SAID COMMONWEALTH, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work specified and described in the following specifications for filling with gravel a portion of Congress Street on the South Boston Flats, all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth :—

Specifications.

Said party of the second part is to furnish all the plant, tools, appliances, labor and materials for filling with gravel, as herein-after specified, Congress Street from C Street easterly to the seawall on the northerly side of the Reserved Channel, on the South Boston Flats, reference being had for the location thereof to a plan on file in the office of the Board of Harbor and Land Commissioners.

The length of street to be filled is about 2,000 feet.

The depth of the gravel filling to be about 3 feet.

The top surface of the street, after the work is completed, to be left smooth and level at grade 16, and 75 feet wide measured at said grade.

The slope of the filling on the sides of the street to be *one and one-half* horizontal to *one* vertical.

The material used for filling to be clean, coarse gravel, free from rocks, large stones or bowlders, clay, loam and vegetable matter, and satisfactory in all respects to the engineer of said Board; and to be deposited, levelled and trimmed in accordance with the lines, grades and directions given by said engineer.

The amount of gravel required is estimated at about 18,000 cubic yards. The amount to be paid for to be ascertained by measurement in the fill after it has been deposited, levelled and trimmed as aforesaid, and no filling to be paid for which is more than 6 inches outside the prescribed lines, grades and slopes.

Said party of the second part to be responsible for all damages to persons or property arising from or in consequence of the work of filling, or from anything done by him in connection therewith. All injuries to sewers, man-holes, catch-basins and connections to be made good by said party of the second part.

The whole work to be completed on or before the thirty-first day of December, 1891.

In all questions which may arise concerning measurements, lines and grades, the decision of said engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by said party of the second part at his own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of said engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of said engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

Estimates to be made by said engineer of the amount of work done and completed up to the end of each calendar month, and payment to be made thereon of ninety per centum of the contract price for such work, as computed by said engineer; and the remaining ten per centum to be paid upon the final completion and acceptance of the whole work.

If said party of the second part refuses or neglects to prosecute the work, or in any other respect fails to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from any breach thereof.

The word "engineer" as used herein means the engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

The words "party of the second part" mean the person contracting to do the work, or his agent in immediate charge of the work.

The word "grade" means the grade above mean low water in Boston harbor, as fixed and used by said engineer in the work of improvement on the South Boston Flats.

And the said party of the first part, in consideration of the per-

formance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of sixty-four (64) cents for each cubic yard of gravel filling, the same to be in full therefor, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council ; and the said George H. Keyes has hereunto set his hand and seal.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD,	}	<i>Harbor and Land Commissioners.</i>
JOHN I. BAKER,		
CHAS. H. HOWLAND,		

GEORGE H. KEYES.

[SEAL.]

In Council, June 11, 1891. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

WILLIAM M. OLIN,

Secretary of the Commonwealth.

[F.]

[See page 41 of this Report, *ante*.]

AN INDENTURE BETWEEN THE COMMONWEALTH OF MASSACHUSETTS
AND THE CUNNINGHAM IRON WORKS COMPANY RELATING TO A
RAILROAD TRACK ACROSS B STREET ON THE SOUTH BOSTON
FLATS.

THIS INDENTURE, made this first day of December, in the year eighteen hundred and ninety-one, by and between the Commonwealth of Massachusetts, acting by its Board of Harbor and Land Commissioners, and the Cunningham Iron Works Company, a corporation established at Boston, in said Commonwealth, —

WITNESSETH, that said Commonwealth doth hereby authorize and license the said corporation to construct, maintain and use one railroad track, of standard gauge, across B Street (so called) on the flats or land of said Commonwealth situate in that part of Boston known as South Boston, the centre line of said track to begin on the easterly side line of said B Street at a point which is distant one hundred and forty-five and ninety-three one-hundredths (145.93) feet southerly from the southerly side line of Congress Street (so called), and thence to run westerly across said B Street curving southerly on the arc of a circle of about one hundred and sixty-seven (167) feet radius, — subject, however, to the following conditions and limitations: —

1. Said corporation shall build and maintain said track on a level with the finished grade of said B Street as the same now is or hereafter from time to time may be established by said Commonwealth or other lawful authority; and shall at all times keep the rails so guarded and protected by plank, timber, paving or otherwise, as to secure a safe and easy passage across said track.

2. Said track may be operated by horse, steam or electric power; but shall not, without the consent of said Commonwealth in writing first duly obtained, be used for any purpose except to convey materials and merchandise, manufactured and unmanufactured, in ordinary railroad freight cars, to and from the works

and premises of said corporation situate on the easterly side of said B Street between Congress and Fargo streets, as may be necessary or convenient in the regular course of the manufacturing business of said corporation there carried on; and no engine or car not in motion shall be allowed to stand on said track within the limits of said B Street.

3. If at any time hereafter, in the opinion of said Board of Harbor and Land Commissioners, the better security of the public requires that a flag be displayed, or that gates or bars be erected, at the crossing aforesaid, said corporation, upon notice in writing by said Board, shall cause a flag to be displayed, or shall erect and maintain gates or bars and cause the same to be closed, whenever an engine or car is about to cross and while crossing said street on said track.

4. Said corporation shall observe and follow the directions of said Board or its engineer in respect to the manner of executing and doing any of the work or other things herein authorized or required, and shall be subject to and shall comply with the provisions of any statute laws, now or hereafter in force, relating to railroads for private use, so far as they are applicable to the railroad track and crossing aforesaid.

5. All things herein authorized or required to be done by said corporation shall be done without cost or expense to the Commonwealth; and said corporation shall assume and pay all claims and demands arising in any manner from the construction, maintenance, use and operation of the track and structures aforesaid, and shall save harmless and indemnify the Commonwealth from all claims, suits, damages, cost and expense by reason thereof.

6. If at any time hereafter some other railroad track of standard gauge, and having a connection with a track of the New York & New England Railroad Company, its successors or assigns, is built for the permanent use of abutments in or along that portion of either of the streets on which the premises of said corporation abut as aforesaid, and if said corporation shall have or shall be given a right to connect with such other track by a branch or switch track running into its said premises, then the right of said corporation to maintain, use and operate the railroad track across B Street hereinbefore authorized, shall thereupon cease; and said corporation, within thirty days after notice in writing given by said Board, shall remove said last-named track and its appurtenances, and shall put the portion of the street where said track was in as good condition for travel as the adjacent portions thereof; and, in case of the failure of said corporation to comply with this condition, or with any other condition hereinbefore set

forth, the Commonwealth reserves and shall have the right by its agents to remove said track and put said street in order as aforesaid, and to recover the cost and expense thereof from said corporation.

IN WITNESS WHEREOF, on the day and year first above written, the Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, hath caused these presents to be signed and delivered in its name and behalf, and its seal to be hereunto affixed, and hath also caused these presents to be approved by its Governor and Council; and the said Cunningham Iron Works Company, by Thomas Cunningham, its treasurer, thereunto duly authorized, hath caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD,	}	Harbor and
JOHN I. BAKER,		Land
CHAS. H. HOWLAND,		Commissioners.

CUNNINGHAM IRON WORKS COMPANY,

By THOS. CUNNINGHAM,

[SEAL OF THE CUNNINGHAM
IRON WORKS CO.]

Treasurer.

In Council, December 30, 1891. Approved.

[SEAL OF THE
COMMONWEALTH]

WM. M. OLIN,

Secretary of the Commonwealth.

[H.]

[See page 46 of this Report, *ante*.]

AN AGREEMENT, MADE THIS THIRTIETH DAY OF MARCH, 1891, BY
AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS AND
GEORGE A. LANCASTER, OF BOSTON, IN SAID COMMONWEALTH.

The said Lancaster hereby agrees to break up the wrecked schooner (name unknown) now lying on the South Boston Flats northerly of Congress Street, and near the line of the prolongation of E Street, and to burn all the fragments thereof, or remove them to such place or places as shall be approved by the Board of Harbor and Land Commissioners; but no part or portion of said wreck shall be left below the level of high water.

The said Lancaster hereby assumes, and shall save said Commonwealth harmless from, all liability for damages to persons or property caused by, or arising in any way in, the execution of this contract.

The said work is to be completed on or before the thirtieth day of April, 1891; and, upon the completion thereof as above described, and to the acceptance of said Board, said Commonwealth agrees to pay to said Lancaster the sum of ninety-nine (99) dollars, the same to be in full compensation for all materials, apparatus, labor, services, cost and expense furnished or incurred therein.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be executed and delivered in its name and behalf, and the same to be approved by its Governor and Council; and the said George A. Lancaster has hereunto set his hand.

THE COMMONWEALTH OF MASSACHUSETTS,

BY JOHN E. SANFORD, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

G. A. LANCASTER.

[SEAL]

In Council, April 8, 1891. Approved.

WM. M. OLIN, *Secretary.*

[I.]

[See Page 46 of this Report, *ante*.]

AN AGREEMENT, MADE THIS FOURTH DAY OF JUNE, 1891, BY
AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS AND
GEORGE W. TOWNSEND, OF BOSTON, IN SAID COMMONWEALTH.

The said Townsend hereby agrees to remove the schooner
“Aladdin,” now lying sunken and abandoned in Fort Point
Channel, in said city of Boston, together with the cargo and all
the parts and appurtenances of said vessel, to some place approved
by, and to the satisfaction and acceptance of, the Board of Harbor
and Land Commissioners of said Commonwealth.

The said Townsend is to furnish at his own cost and expense
all the plant, apparatus, materials, appliances and labor necessary
for said work, and to save the Commonwealth harmless from all
liability for damages to any person or property caused or arising
in any way in or from the execution of this contract.

The said Townsend may dispose of the said vessel, her cargo
and appurtenances, after removal as aforesaid, to his own use and
benefit.

The work of removal is to be commenced at once, and completed
within fourteen days from the date hereof.

Upon the completion of this contract as aforesaid, said Com-
monwealth agrees to pay said Townsend the sum of five hundred
dollars (\$500), the same to be in full compensation for all things
furnished and done, and for all cost and expense incurred, by him
in the execution thereof.

IN WITNESS WHEREOF, on the day and year first above written,
the said Commonwealth, acting by its said Board of Harbor and
Land Commissioners, has caused these presents to be signed and
delivered in its name and behalf, and the same to be approved by
its Governor and Council ; and the said George W. Townsend has
hereunto set his hand.

THE COMMONWEALTH OF MASSACHUSETTS,

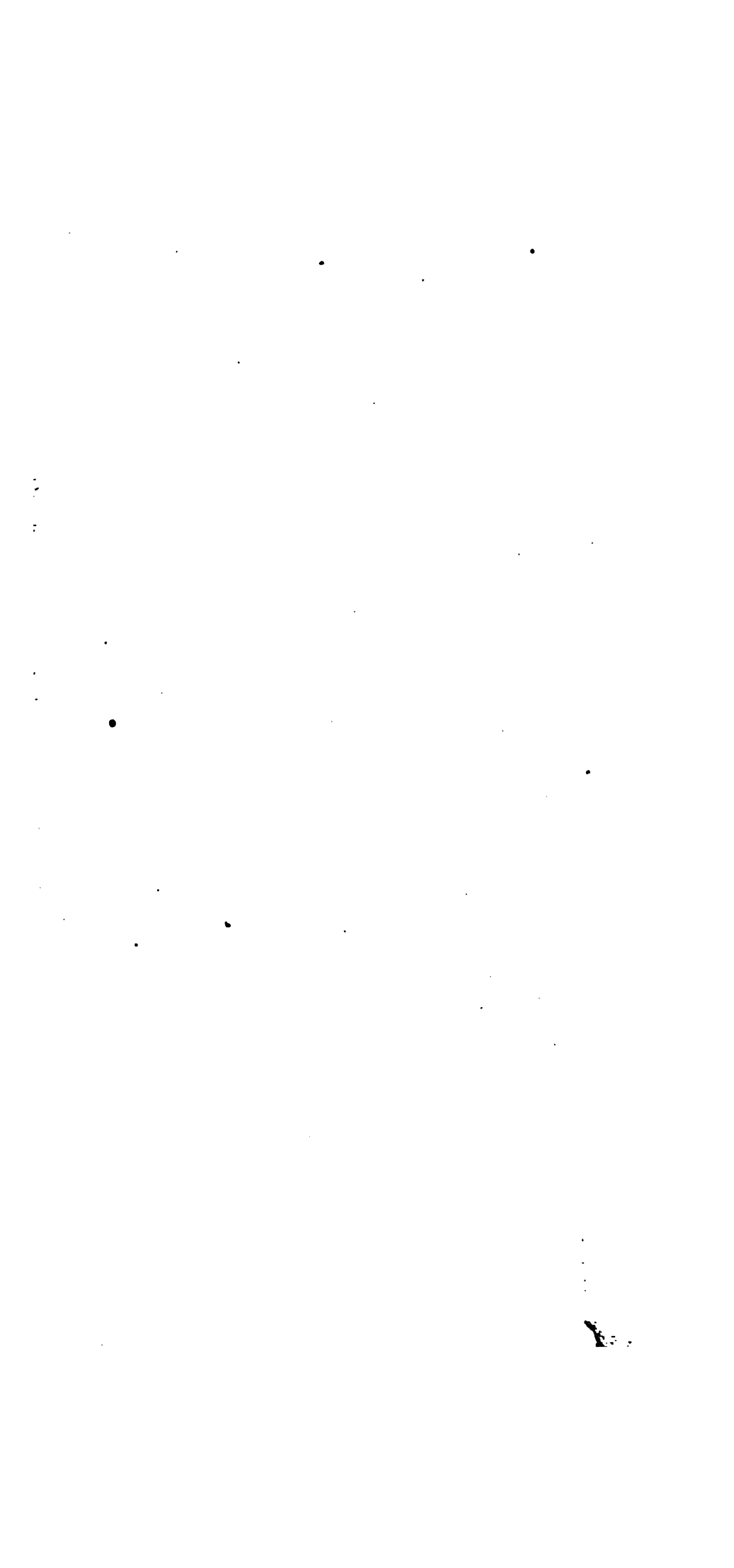
BY JOHN E. SANFORD, } *Harbor and Land*
CHAS. H. HOWLAND, } *Commissioners.*

GEO. W. TOWNSEND.

[SEAL.]

In Council, June 11, 1891. Approved.

WM. M. OLIN, *Secretary*





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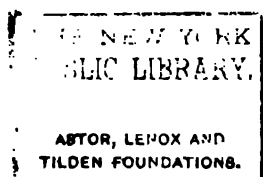
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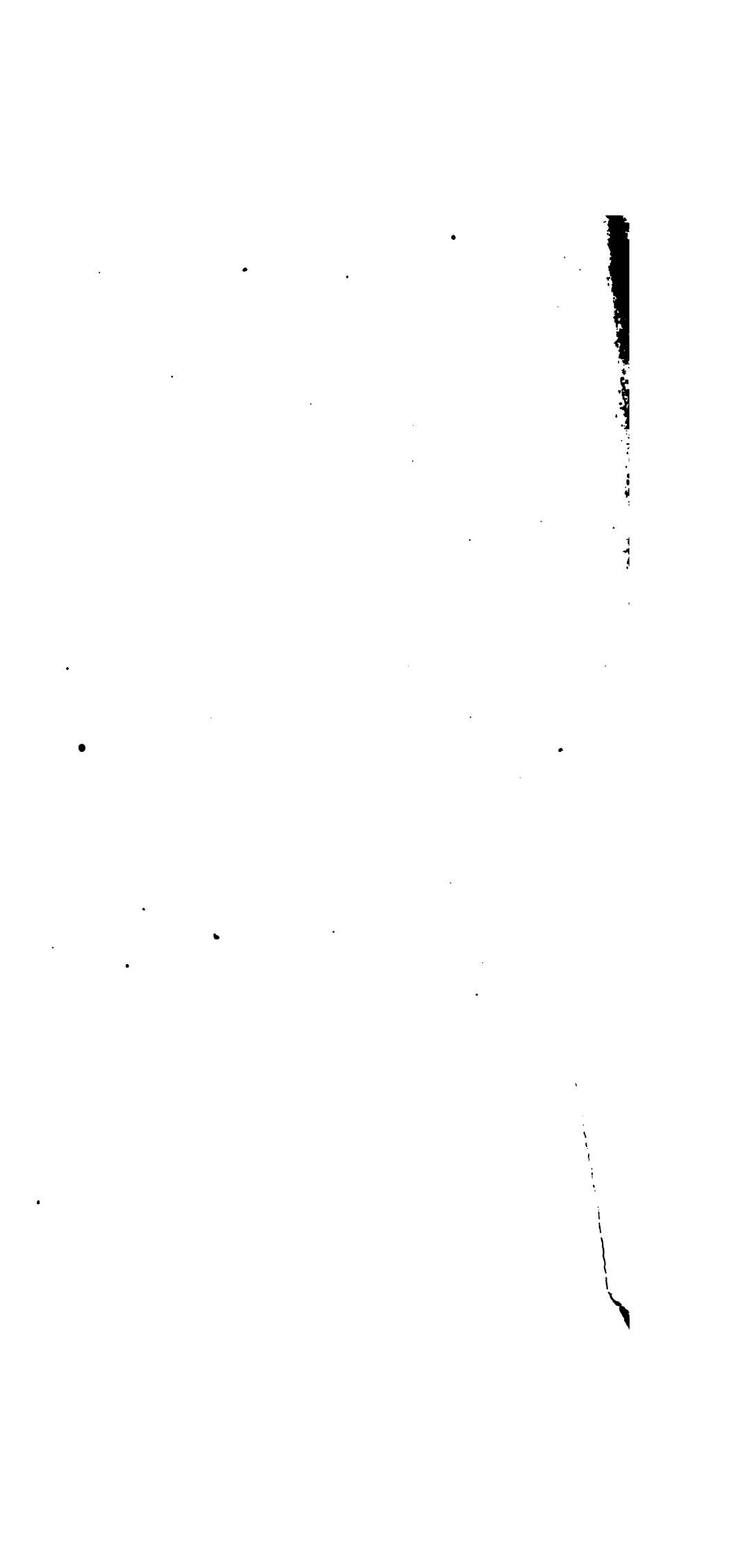
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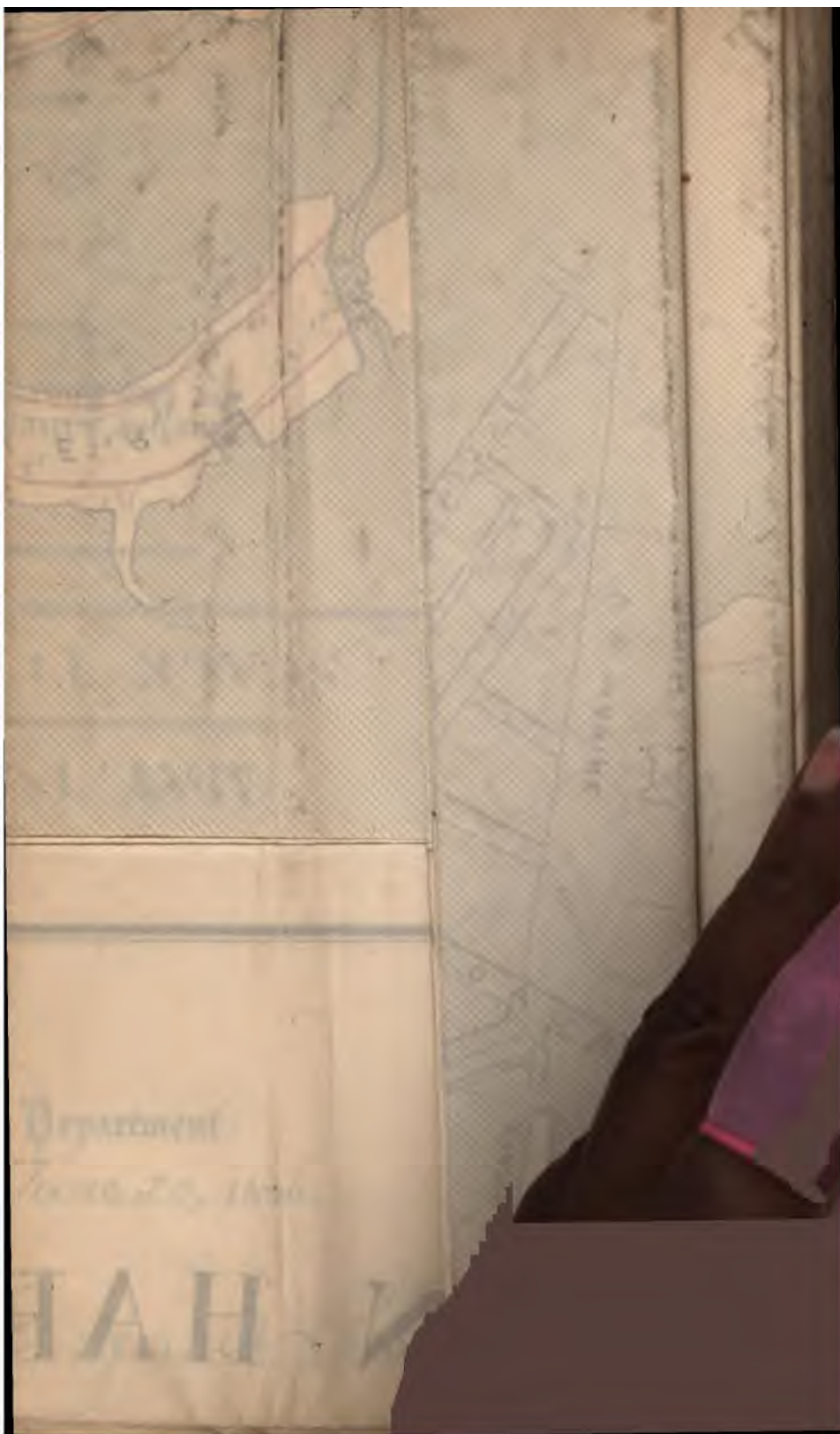
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ANNUAL REPORT

OF THE

BOARD OF

SEAPOR AND LAND COMMISSIONERS

FOR THE YEAR 1892.

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ANNUAL REPORT

OF THE

BOARD OF

WATER AND LAND COMMISSIONERS

FOR THE YEAR 1892.



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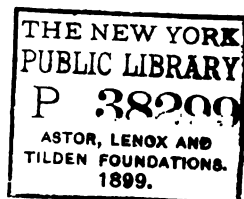
. . . . No. 11.

ANNUAL REPORT

OF THE

BOARD OF

BOR AND LAND COMMISSIONERS



FOR THE YEAR 1892.

BOSTON:

IT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.

1893.

1. The first part of the document is a list of names and titles.

Commonwealth of Massachusetts.

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts:

The Board of Harbor and Land Commissioners, as required by the provisions of section 2 of chapter 19 of the Public Statutes, respectfully submit the following report of their doings in the year 1892.

GENERAL STATEMENT OF THE WORK OF THE YEAR.

During the year the Board have held one hundred and three formal sessions, of which fifty were held on Thursdays, the regular day of meeting of the Board, and fifty-three on other days. At these meetings, besides the transaction of routine business, two hundred and seventeen hearings were given upon applications for licenses and other matters appertaining to the business of the Board. The Board have passed upon one hundred and fifteen applications for licenses for structures in tide water, in great ponds and in the Connecticut River. Of these, one hundred and four were granted, many of them with essential modifications or with conditions imposed by the Board. Of the remaining applications, two were withdrawn by the petitioners after hearing, six were refused, and on three action was deferred.

The completion of the L Street bridge across the reserved channel at South Boston, connecting Congress Street on the one side with L Street on the other, is an exceedingly important step in the development of the lands of the Commonwealth at the South Boston flats. The portion of Congress Street, which crosses the lands of the Commonwealth, will probably be widened to one hundred feet by the city of Boston, and the only thing which delays

4 HARBOR AND LAND COMMISSIONERS. [Jan.

the completion and paving of that street by the city is the proposed abolition of the grade crossing over the freight tracks of the New York & New England Railroad Company. The city has applied to the superior court for the appointment of a commission under the provisions of the grade crossing act, to compel the separation of the grades of the street and the railroad tracks.

As soon as this matter is settled and the street can be opened for travel, Congress Street will at once become the most important thoroughfare connecting South Boston with the city proper, and the lands of the Commonwealth will be brought advantageously into the market. The Board have recently received several important applications for the purchase of land. They have declined to sell any lots extending beyond a line one hundred and fifty feet north of Congress Street, as they deem it essential to reserve all the remaining portion of the Commonwealth's land upon that side of the street for use in connection with the piers and docks which are contemplated by the plan adopted for the development of the Commonwealth's property and the improvement of the harbor.

As the lands of the South Boston flats, which are not thus reserved, are sold from time to time by the Commonwealth for warehouses and manufacturing purposes, as seems likely to occur, it is hoped that the proceeds of such sales, which are required to be paid into the Commonwealth's flats improvement fund, will be sufficient in amount to enable the Board to begin work upon the piers and docks, the construction of which is the principal purpose of the plan. This Board consider that the Legislature, in authorizing the filling and further acquisition of the flats at South Boston, and in creating and maintaining annually the Commonwealth's flats improvement fund, did not intend to enter into a land speculation, although incidentally the sales of land already made have been reasonably profitable to the Commonwealth, and those hereafter made are likely to be still more so. But we believe the wise purpose of the Legislature to have been to add to the terminal facilities of Boston harbor by constructing or allowing to be constructed by some steamship or railroad company, or by

individuals, a series of docks and piers at this very convenient portion of the harbor, suitable for the largest ocean-going vessels.

The plan has now reached a very interesting stage of development, where it looks as if this great work of improvement to the harbor facilities of Boston might soon be actually begun.

The Fort Point channel, on account of its penetrating an important business section and being near the heart of the city, is, although narrow and crossed by many bridges, a very important body of water to the commerce of Boston. The tonnage passing through its bridges is very great and the value of the cargoes landed there proportionately large.

During the year the city of Boston passed an ordinance, which was submitted to the Board for approval as required by the statutes of the Commonwealth, proposing to close the draws in the highway bridges over the Fort Point channel between certain hours, at morning, noon and night, when the land travel over these bridges is the greatest.

The Board gave a hearing upon the matter, at which the city and also the various shipping and commercial interests affected by the proposed closing of the draws were represented. It appeared that the largest vessels using the Fort Point channel, which are naturally the most important commercially, cannot pass through the draws of the bridges except at high tide, and that the proposed closing of the draws when high tide occurred within the hours of closing might in some cases cause a delay of twenty-four hours, or even longer. After a very thorough investigation of the facts of the case, the Board declined to concur in the action of the city, and the proposed ordinance failed to become a law.

The ordinance also covered a proposed closing of the draw of the Chelsea bridge over the south channel of Mystic River, and the same decision was arrived at in that case.

In view of the exceeding difficulty of making any reasonable regulations to compel the absolute closing of these draws within certain hours, the Board deem the matter to be well provided for by the existing provisions of the

Public Statutes, which leave the question of the closing and opening of the draws to the reasonable discretion of the draw-tender, the statute providing that the draw-tender shall furnish all facilities for the passing of vessels, and "shall allow no detention, *having due regard for the public travel.*"

The labors of the Board have of late years been considerably increased by the duties imposed upon them by chapter 318 of the Acts of 1888, extending their jurisdiction to great ponds of more than ten acres. Some of the most difficult cases which the Board have had to decide during this year were those relating to licensing the taking of water from great ponds for the purpose of flowing cranberry bogs.

Under the jurisdiction given by chapter 344 of the Acts of 1885, for the protection of the Connecticut River, the Board, at the request of the city of Springfield, surveyed and designated a river line at Springfield beyond which no extension shall be allowed, with the intention of recommending its establishment to the Legislature. The city of Springfield afterwards asked to have the line extended at either end so as to cover the whole boundary of the city on the river, and the Board consented to this, provided the engineer of the city of Springfield would make the surveys necessary for such extension, subject to subsequent approval by the Board. This the city agreed to do, but the delay thus caused in the final designation of the line may prevent its presentation to the Legislature of this year.

Under the powers given to the Board by chapter 260 of the Acts of 1883, they have caused the removal of several wrecks during the year, the facts in regard to which are stated later in this report. This power is a very useful one, inasmuch as the United States authorities, although they have a large appropriation for the purpose of the removal of wrecks, are so tied up by the provisions of the United States statute upon the subject that it is impossible for them to act except after notice by publication of at least thirty days. So that, in a case like that of the schooner "Lizzie Williams," which was sunk on the 27th of April, 1892, in the middle o

the main channel of Boston harbor directly in the track of ocean steamers and other vessels, the United States officers are powerless to make a prompt removal of the wreck. Under the provisions of the above named statute of the Commonwealth, this Board were able, in the case of the "Lizzie Williams," to take prompt action, and her removal from the channel was accomplished on May 12.

Section 10 of the above-named statute provides that it shall be the duty of the Board of Harbor and Land Commissioners to make application in behalf of the Commonwealth for the reimbursement of any sums expended under this act which in the opinion of said Board might properly be paid by the United States. This has never yet been done, but the sums paid from time to time, in cases similar to that of the "Lizzie Williams," for which the United States might properly be asked to reimburse the Commonwealth, amount now to several thousand dollars, and the Board have in contemplation making a request for such reimbursement by the United States, as soon as in their judgment the amount is sufficiently large to ask for.

The work of improving the various harbors of the Commonwealth, under the laws and appropriations made by the Congress of the United States, has been ably and successfully carried on during the year by Lieut. Col. S. M. Mansfield, of the Corps of Engineers, U. S. A., who is in charge of the eastern district, and has his headquarters in Boston, and by Captain W. H. Bixby, of the Corps of Engineers, U. S. A., who is in charge of the southern district, and has his headquarters at Newport, R. I. These officers have constantly given to this Board their cordial assistance and co-operation, and we are greatly indebted to them for the interesting statements of the work respectively accomplished by them during the year, which are appended to this report.

We are also enabled through the kindness of Prof. T. C. Mendenhall to give a statement from him in regard to the work done during the year in Boston Harbor by the United States Coast and Geodetic Survey.

By the River and Harbor Act passed by the Congress of the United States in 1892 an amendment was made to one of the sections of the River and Harbor Act of 1890 relating to bridges and other obstructions in navigable waters. This amendment will be found printed in the Appendix to this Report and marked [H.]

SOUTH BOSTON FLATS.

The work of filling and improving the tide-water lands of the Commonwealth at South Boston has been continued during the year on the same general plan followed during the past few years.

The one-hundred-acre lot, which is all filled to grade 13, and on a portion of which the streets are graded with gravel, is in very good condition, and the sewers and their appurtenances are in good repair. The bulkhead on the northerly side of this lot, which was built in 1891, is in good condition.

Most of the work during the year has been done on the seventy-five-acre lot which adjoins the one-hundred-acre lot on the east.

The work covered by the contract with the New England Dredging Company has been completed and accepted. This contract was dated April 8, 1889, and its terms have been stated in previous reports. During the year about 44,800 cubic yards of material have been accepted by the Board as deposited under this contract, which is equivalent when levelled to about two and one-half acres of completed land, making in all twenty-nine and one-half acres of land made under this contract. The final payments have not been made under this contract, as the contractor has made a claim for additional compensation, which has not as yet been adjusted.

Early in January, 1892, a contract* was made with the San Francisco Bridge Company, the lowest of five bidders whose bids were opened Dec. 31, 1891, for dredging about 200,000 cubic yards from the reserved channel and filling in the areas still remaining to be filled south of Congress Street, and also for rehandling about 212,000 cubic yards of material

* See Appendix A.

which the United States Government was about to dredge from the upper middle channel, using this for completing the filling south of Congress Street and partially filling the area inclosed by the bulkhead north of Congress Street. The price is twenty cents per cubic yard, measured in the fill, which is much less than has been previously paid for similar work. Work was really begun about the middle of May, although a small amount had been dredged from the location of the L Street bridge before that date, and up to January 1, 1893, 250,000 cubic yards have been deposited on the areas to be filled. The areas south of Congress Street have been substantially completed, and work is now going on on the area north of Congress Street.

The method used is new in the work upon the South Boston flats, being one which has been used to a considerable extent on the Pacific Coast. It is called the hydraulic method. The dredge consists of a scow containing a large rotary pump, the engines and boilers for operating the same and the cutters for loosening the material. The material is sucked into the pump together with a large quantity of water and forced ashore through a line of pipes supported on pontoons. When discharged upon the area to be filled the material settles and the water flows off through sluiceways provided for it. The area thus to be filled has to be surrounded by a water-tight dike. This method, so far as we can judge at present, is well adapted to the work on the South Boston flats. The filling is considerably ahead of the requirements of the contract, which calls for 20,000 cubic yards per month, beginning April 1, 1892. The work under this contract is to be completed before July 1, 1893.

On July 1, 1892, a contract* was made with the Eastern Dredging Company to rehandle about 100,000 cubic yards of material which that company was to dredge near Mystic wharf under a contract with the Boston & Maine Railroad, and to fill with the same the north-easterly corner of the seventy-five-acre lot, at the price of fourteen cents per cubic yard measured in the scows, and at the option of the commissioners the whole area assigned for their work

* See Appendix B.

was to be filled, requiring an additional amount of from 75,000 to 100,000 cubic yards. Under this contract no money is required to be paid until after April 1, 1893. Up to Jan. 1, 1893, 98,531 cubic yards have been deposited under this contract. The material is largely sand with some stone and clay, and the price is about two-thirds of the price formerly paid for rehandling.

On Dec. 29, 1892, the Board voted to take advantage of the option given them by the contract of July 1, 1892, to have the whole assigned area filled on the same terms, and a supplemental contract* to this effect has accordingly been made. The work under this contract is to be completed before the first day of January, 1894.

On September 8, 1892, a contract† was made with W. A. Kenrick & Son, the lowest bidder, to build about 300 feet of wooden bulkhead to close the two gaps in the bulkhead inclosing the seventy-five-acre lot for the sum of \$1,500, and the work has been satisfactorily completed.

The contract with the New England Dredging Company, dated June 25, 1891, and printed in the Appendix to the Report of this Board for 1891, for filling back of the sea-wall on the northerly side of the reserved channel, was settled on the basis of the work done in August, 1891, as it was found to be mutually advantageous not to complete it.

The amount of material brought to the flats in carts during the year has been quite large. It has been put mostly on the seventy-five-acre lot along the extension of E Street and near the bulkhead on the northerly side of the lot. Quite a large quantity was also placed on the lot leased to the Walworth Manufacturing Company and on the lots abutting on Congress Street between C and D streets, to raise the grade and leave a harder and dryer surface. The Boston street department has raised the surface of D Street for a distance of about eight hundred feet from First Street, with the gravel excavated from the streets in South Boston which were being paved; and a small amount of gravel excavated from Washington Street during the repaving of that street was placed by the contractors on D Street at its intersec-

* See Appendix C.

† See Appendix D.

tion with Congress Street, at an expense to the Commonwealth of ten cents per cubic yard.

The material brought to the flats by the city ash carts has for a long time been decreasing both in amount and in value for purposes of filling. The price paid for it has been reduced twice, and the Board recently decided to no longer pay for this material, but to allow the city to continue to deposit it if the city authorities so desired and would provide a man to take care of it on its arrival. Notice to this effect was sent to the superintendent of streets on Sept. 15, 1892.

Congress Street.

The work under the contract with Geo. H. Keyes for grading Congress Street with gravel from C Street to the seawall at the reserved channel was finished about the middle of January, 1892, and the work approved. This completed the filling of Congress Street from Fort Point channel to the reserved channel.

During the autumn just passed, the New York & New England Railroad Company placed four new tracks across Congress Street, in addition to their seven tracks already there, thus increasing the difficulty and danger of reaching the Commonwealth's property from the city.

On February 21, 1892, a letter was sent to the mayor of Boston, requesting that the city proceed with the laying out of that portion of Congress Street east of C Street, and that it submit plans for abolishing the grade crossing with the tracks of the New York & New England Railroad Company. Subsequently conferences were had with the mayor, the city engineer and the law department of the city, and the city petitioned the superior court for the appointment of a commission to abolish the grade crossing. Steps have also been taken by the city government towards laying out the street. The question of widening to one hundred feet the portion of Congress Street which crosses the land of the Commonwealth is also being considered, and it is probable that this will be done by adding twenty-five feet on the northerly side.

L Street Bridge.

The bridge over the reserved channel connecting Congress

Street with I. Street in South Boston has been completed, and the approaches at both ends are graded except for a distance of about fifty feet near the South Boston end of the bridge. The cost of the bridge was \$125,415.53, and forty per cent. thereof, amounting to \$50,166.21, has been paid by the Commonwealth to the city, as provided by chapter 388, of the Acts of 1891, and chapter 12, of the Acts of 1892. The bridge is built of wood, and is supported on oak piles and a stone abutment at each end. The sliding draw is built of iron and is operated by steam, and the passage-way for vessels is forty feet wide. All the work has been done in a very substantial manner.

Sales and Leases of Land.

The following sales and leases have been made during the year :—

The Commonwealth by the Board sold to the Cunningham Iron Works Company, June 21, 1892, 7,600 square feet on the southerly side of Congress Street, between B and C streets, and on November 3, 1892, 6,681 square feet on the northerly side of Fargo Street, between B and C streets. These two lots together make a strip 50 feet wide, running through from Congress Street to Fargo Street, and adjoin the easterly side of the lot previously sold to the same company. The price paid was 50 cents per square foot in each case, and bonds for deeds were given. The buildings on the Cunningham property have been completed, and the boiler works are in full operation.

Early in July conferences were held with representatives of the Walworth Manufacturing Company, who desired to buy a lot on the northerly side of Congress Street, between B and C streets, on which to erect a storehouse. Owing to the unsettled condition of the lines and grades of Congress Street in connection with the proposed widening of the street and the separation of the grades at the railroad crossing, the Board did not think it advisable to give a deed in this location until the lines and grades of the street had been settled. Accordingly a lease and agreement to sell at the end of five years, or earlier in case the lines and grades of street were sooner determined, was made with the company

for the lot on the northerly side of Congress Street, 150 feet deep, and extending the whole distance from B to C streets 485.87 feet, the price to be 75 cents per square foot, and the rental to be at the rate of \$2,186.40 per year until the purchase is completed. The Walworth Manufacturing Company has erected on this lot a large one-story wooden storehouse, which, as required by the lease, is so placed that the street can be widened to one hundred feet without interfering with it.

September 22, 1892, a lease was given to Mr. Peter McConarty of a lot 50 feet wide, extending from Cypher Street through to Anchor Street, 200 feet, the lease to run two years from Oct. 1, 1892, and the rent to be \$240 per annum.

Two small lots, 12,500 square feet in all, on the northerly side of the one-hundred-acre lot are still let by the Commonwealth for the purpose of landing sand and ballast on such terms as will not interfere with any permanent disposition of the property. The rent received is \$125 per annum.

Fan Piece.

Final settlement has been made for the flats and water rights bought and taken by the Commonwealth on the northerly shore of South Boston, between B and E streets, under chapter 446 of the Acts of 1869 and chapter 290 of the Acts of 1884. This matter was completed by the settlement for the sum of \$5,000 of the case of *Moore et al. vs. Commonwealth*. This suit covered three-eighths of the so-called "fan piece."

Reserved Channel.

During the year the reserved channel agreement has been executed by the owners of the Harrison Loring estate, and the Commonwealth is thereby authorized to remove the end of the wharf upon that estate which now projects into the reserved channel as laid out.

The Walworth Manufacturing Company has also executed the said agreement as to a lot 75 feet wide which it has recently purchased adjoining on the easterly side the lot on which its works are situated.

14 HARBOR AND LAND COMMISSIONERS. [Jan.

In the spring of 1892 six new buoys were placed to mark the reserved channel.

Provisions for Continuing the Work.

The balance in the "Commonwealth's Flats Improvement Fund" on the first of January, 1892, available for carrying on the work, was \$60,381.62; to which has been added during the year \$2,285.03 from income of the fund, \$12,604.83 from rents of land and proceeds of land sold, \$75,000 paid into the fund from the treasury of the Commonwealth under the provisions of chapter 93 of the Acts of 1889 and chapter 13 of the Acts of 1892, and \$50,166.21 paid into the fund from the treasury of the Commonwealth under the provisions of chapter 388 of the Acts of 1891 and chapter 12 of the Acts of 1892, for the purpose of paying forty per cent. of the cost of the L Street bridge in accordance with the terms of those Acts, making a total of \$200,437.69. Of this sum there has been expended during the year including the above-named payment for the L Street bridge \$136,811.76, leaving an available balance upon Jan. 1, 1893, of \$63,625.93. In order to provide for the work now in progress and in contemplation, it is estimated that it will be necessary to provide for the payment of \$95,000 into the fund the present year.

FIELD AND OFFICE WORK.

Miscellaneous Surveys.

The work on the South Boston flats has occupied rather more of the time of the engineering force than usual, owing partly to the change in the methods of filling used by the contractors. During the three summer months all the time which could be spared from regular work was spent in making a series of soundings and borings, which show the depths of water and of soft mud overlying the hard clay or gravel. These borings cover nearly the whole area which it is proposed to fill east and north of the seventy-five and one-hundred acre lots, and furnish data which will be required to intelligently plan out the work of improvement in the future. The borings were made in lines spaced 200

feet apart, and were taken from about 100 to 150 feet apart on these lines. In all 426 borings were made.

In July a plane-table survey was made, to correct the office plan of the northerly and easterly shores of South Boston by mapping the changes which had been made there, including the Marine Park, the L Street bridge, the Commonwealth's improvements on the South Boston flats, and the changes along the Boston shore of Fort Point channel below and including Federal Street bridge. Greater changes have taken place in this locality during the last few years than in any other portion of the harbor. On the plan named the results of the borings and soundings above described have been indicated.

In July a survey was made at the entrance to Broad Canal in Cambridge, to determine whether the channel had been dredged as required by the license from this Board to the City of Cambridge to build the recently constructed bridge over Broad Canal at First Street. It was found that additional dredging was required, and the city of Cambridge has, upon notice from the Board, caused this to be done.

In July and August a survey was made of the area in Charles River dredged under license from this Board to obtain material for filling the flats belonging to the Francis and Heath estates and the Riverbank Improvement Company. Upon plotting the survey it was found that in doing the dredging some shoals had been left contrary to the terms of the license, and the licensees were notified to have them removed, and did so.

In November a survey was made of the shore in Hull near the yacht club wharf, to determine whether a certain bulkhead which had been built there was above or below high-water mark.

DREDGED MATERIAL.

Since 1879 the Board have until recently offered inducements to persons having dredged material to dispose of, to deposit it on the South Boston flats. This enabled the Commonwealth to get its filling done cheaper and other parties to get their dredging done cheaper than either otherwise could have done, as it cost less to dispose of the material

there than at any other available place. While studying during this year the plans for the improvement of the flats, it was found that, if the work was carried out in accordance with the plans in this office, the amount of material which would have to be dredged would do the filling required, and that, if any more material was received from other sources, it would necessitate the removal of a like quantity of material by the Commonwealth to some other place, probably out to sea, at additional expense. In view of these facts, the Board on June 30, 1892, issued the following notice: —

NOTICE TO DREDGERS BY BOARD OF HARBOR AND LAND COMMISSIONERS.

All persons and corporations engaged in the business of dredging are hereby notified that the Board of Harbor and Land Commissioners will, after this date, give no further authority to dump mud or other material on any part of the lands or flats of the Commonwealth at South Boston, except under contracts with the Commonwealth for filling the said flats.

BOARD OF HARBOR AND LAND COMMISSIONERS,

By HENRY W. SWIFT, *Chairman*.

JUNE 30, 1892.

The result of this notice was to at once increase the cost of dredging in the harbor, as no other place is at present available inside the harbor for dumping material in large quantities; and application was made by the dredging companies for the assignment of a location at which any and all material might be deposited when it was not required for filling. The Board thereupon decided to require that all such material should be deposited outside of a line drawn between Egg Rock and Minot's Ledge Light House, which is the line theretofore established by the United States authorities for the purpose of disposing of material dredged under contracts made by them; and notices of this requirement were sent to all the parties doing dredging in Boston Harbor. This dumping place is very much exposed and in stormy weather impracticable, and its distance from the dredging grounds and security from ordinary observation afford a temptation to the men in charge of the dumping to deposit the

material inside of the limit, and possibly in the harbor channels unless the work is carefully inspected. The Board sent an inspector with the first few scows, but had no funds to continue the work. In answer to an inquiry from this Board Lieut. Col. S. M. Mansfield, the United States engineer officer in charge of this district, stated that he had no funds directly available for the work of inspection, but that, if he was notified when the dumping was to be done, he might be able to look after it. The Board have requested the dredging companies to notify them when they have material which they propose to send to sea.

PROPOSED CLOSING OF THE DRAWS IN FORT POINT CHANNEL
AND OF THE DRAW OF CHELSEA BRIDGE OVER THE SOUTH
CHANNEL OF THE MYSTIC RIVER.

Section 28 of chapter 53 of the Public Statutes provides that a city or town in which a draw for the passage of vessels through a bridge used as a public highway and maintained at the public expense is situated may make ordinances or by-laws regulating the passage of vessels through such draw; but no such ordinance or by-law shall take effect until approved by the Board of Harbor and Land Commissioners. Under the powers given by this statute, the city of Boston passed the following ordinance, subject to the approval of this Board:—

Revised Ordinances of 1892.

[CHAPTER 36, SECTION 3]

“, but he [each draw tender] shall not allow any vessel to pass through the draws of Congress Street bridge, Mount Washington Avenue bridge, Federal Street bridge, Broadway bridge, or Dover Street bridge, on any day, except Sundays and holidays, from 6.15 o'clock A.M. to 8 o'clock A.M., or from 12 o'clock M. to 1 o'clock P.M., or from 6 o'clock P.M. to 7 o'clock P.M.;”

By subsequent amendment the following was added:—

“or through the draw of Chelsea bridge, south, from 11.55 o'clock A.M. to 12.10 o'clock P.M., or from 12.50 o'clock P.M. to 1 o'clock P.M.”

This ordinance as amended was presented to the Board

for their approval on July 7, 1892. The corporation counsel of the city appeared before the Board in regard to this matter on July 21, 1892, and notice was given for hearing on July 28, 1892. The hearing was accordingly given on that day. A further hearing was given upon Aug. 2, 1892. These hearings were very fully attended, and the testimony, which was taken down by a stenographer, is on file in the office of the Board. On Aug. 25, 1892, the Board declined, as has been already stated earlier in this report, to approve the said ordinance, and the mayor of Boston was duly notified of their action.

CHARLES RIVER.

The principal work during the year in the Charles River basin has been done in connection with the improvements made by the Charles River Embankment Company and adjoining proprietors. Nearly all the area between the Grand Junction Railroad and the embankment line, and between Front Street and a line about 1,500 feet west of and parallel to Front Street, has been filled to the grade of 12 feet above low water, and streets have been filled to grade 16 over about one-half of it. All the material for filling including the gravel for streets has been taken from the river directly in front of the area filled, as required by the terms of the license granted by this Board. When the filling is completed, this dredged area will have from 12 to 15 feet of water over it at low water from the embankment line to the channel and extending the whole length of the area filled. About 432,000 cubic yards of material have been dredged and deposited during the year by the Charles River Embankment Company, and about 175,000 cubic yards by adjoining proprietors in connection with the same improvement.

On the Boston side, the only work done during the year was done in connection with the work of the Riverbank Improvement Company, and consisted of the removal by dredging of a few shoal ridges which had been left by the dredgers who did the filling and which were considered obstructions to navigation.

In the basin between West Boston and Craigie bridges,

on the Cambridge side, about 640 feet of sea-wall have been built, so that there is now a continuous sea-wall from Broad Canal to the Binney Street sewer. A bridge with a draw has been built by the city of Cambridge across Broad Canal, and First Street has been filled so that it is now continuous from Main Street to East Cambridge, and considerable filling has also been done on the area between Broad Canal and Binney Street, on both sides of First Street.

MYSTIC RIVER.

The improvement of the flats in Mystic River below Elm Street in Charlestown is substantially completed so far as authorized by the terms of the legislative grants to the Mystic River Corporation.

This property was bought by the Boston & Lowell Railroad Corporation and the larger part of the work was done by it and its lessor, the Boston & Maine Railroad. The whole tract of ninety acres is now filled to grade 14.5, and is inclosed by a substantial sea-wall on the north and south channels and by a wooden bulkhead on the line of Elm Street.

During the year, 56,716 cubic yards of material have been dredged by the railroad company and placed inside the sea-walls to complete the filling, and about 100,000 cubic yards have also been dredged from the flats and channel outside the sea-wall and taken to the South Boston flats.

Most of the dredging during the year was done to a greater depth or beyond the limits prescribed by the original grant. This was necessary in order to allow large modern vessels to come to the wharf.

On May 24, 1892, upon application of the railroad company, plans were approved by this Board, under the provisions of chapter 309 of the Acts of 1887, which were subsequently approved by the Secretary of War, for extending the southerly wharf below Chelsea bridge by making the pile platform 40 feet wide at its easterly end and along the side of the adjoining dock. About one-half of the work thus authorized has been done. The railroad company applied at the same time for the approval of plans for widening their platform extending into the south channel.

This application was refused by the Board. A large grain elevator of the capacity of 1,500,000 bushels, also large freight houses and coal elevators, have been built, and the necessary tracks connecting therewith have been laid.

CONNECTICUT RIVER.

A good deal of time has been devoted by the Board and their engineer during the year to the consideration of matters relating to the Connecticut River. The action of the Board in regard to the establishment of a river line at Springfield has already been stated in this report.

The protective work on the river bank at West Springfield is in good condition, but the town of West Springfield should take some proper steps to prevent people who use the river bank from removing or disarranging the stones that form the riprapping.

BACK BAY LANDS.

Release of Mercantile Restriction on Boylston Street.

On March 10, 1892, a petition was received from the heirs of the estate of Mary A. Pitkin, asking for a release from a certain portion of the restrictions in a deed from the Commonwealth of a lot of land now belonging to said heirs on the northerly side of Boylston Street between Arlington and Berkeley streets in the city of Boston. The portion of the restrictions from which the petitioners asked to be released prohibited the use of the land for mercantile purposes. A hearing was given on March 24, 1892, and no one appeared in opposition to the granting of the petition. The Board were satisfied that the restriction was inserted by mistake in the original deed, other deeds from the Commonwealth of land upon that portion of Boylston Street having been given without this restriction. This case was in all respects similar to that of Ella A. Phillips, owner of the adjoining estate, to whom a release from the mercantile restriction was given by the Commonwealth on Sept 23, 1891. On March 29, 1892, the Board executed the release petitioned for by the Pitkin heirs, fixing the compensation at the same rate as that which was charged in case of the release to Mrs.

Phillips above named. It amounted to \$88.33, which was paid to the treasurer of the Commonwealth.

Algonquin Club Case.

Early in the autumn of the year 1887 it was brought to the attention of the Board that the Algonquin Club was putting up a building on Commonwealth Avenue in violation of the restrictions of the deeds from the Commonwealth, which required that the front wall should be set back twenty feet, except that steps, windows, porticos and other usual projections are allowed in this reserved space, provided that the bay windows be contained within the limits of a trapezoid proportioned to the width of the building itself. Notwithstanding the notice from the Board, which was sent to the club on the seventh day of September, 1887, and again upon the twenty-second day of the same month, the club proceeded to project the whole basement story five feet beyond the front wall of the main building. A bill of complaint was filed in the supreme judicial court by the attorney-general, on behalf of the Commonwealth at the relation of this Board on the thirteenth day of June, 1888; and thereafter there were repeated conferences and hearings with the officers and counsel of the club and with its architects in regard to the removal of the unauthorized projections. This, however, not being done, the cause was heard before Mr. Justice Holmes in the autumn of the year 1890, and reported by him to the full court, where it was argued in January, 1891, and on the first day of April, 1891, a rescript was sent down confirming the position taken by this Board. Pending the entry of a decree, application was made to the Legislature by the club for relief, and, on failure to secure the requisite number of votes to suspend the joint rules, it went over to the next General Court. The decree was duly entered and an appeal therefrom to the full court was taken by the defendant. On motion, after hearing, the full court determined that the appeal should be heard out of course and in advance, and thereupon after argument the decree was confirmed, and the unauthorized projections have been removed in conformity thereto.

It is important to notice that, in addition to passing upon

the special projections complained of in this cause, the court has sustained the position taken by the Board, that the design of the restrictions was, not only to give light and air to the adjoining estates, but still more for the preservation of a broad avenue to the width of two hundred feet, with a further space of twenty feet on each side, substantially free from buildings.

The case is reported in Vol. 153 of the Massachusetts Reports, page 447. The following is an extract from the opinion of the Court :—

“The space was reserved for reasons affecting not only neighboring owners, but the public at large. Compensation to the Commonwealth for such an intrusion into the reserved space would be an unsuitable remedy. The injury is one not easily measurable by money. It is, then, a question whether the defendant shall be allowed to retain its unauthorized projections, or shall be compelled to make such alterations as will bring them within the provisions of the deeds. We cannot say, under the circumstances as they appear, that the injury is trifling or unsubstantial. If one such intrusion into the reserved space is allowed to pass, others must be. When a general plan has been laid out in behalf of the Commonwealth for the improvement of land, and the construction of a broad avenue for the benefit of all purchasers of lots upon it and of the public at large, with specific restrictions requiring conformity thereto inserted in the deeds, it is of importance that architects and builders should understand that the Commonwealth has a right to insist that its rules and limitations must be observed; and a violation so considerable as is shown in the present case, when made in the face of distinct notice and prohibition from the public authorities, cannot be entitled to indulgence, as a matter of right. In a suit brought under such circumstances in behalf of the Commonwealth to enforce the language of its deeds, we are not at liberty to say that the defendant shall not be held bound by the restriction, on the ground that the injury is slight, unless it is so small as to fall within the maxim *de minimis*. Stronger reasons apply where the suit is brought by the Attorney-General to enforce a public right; but even in suits brought by private parties, a removal has been ordered.” (*Cases cited.*)

“In respect to the basement story a mandatory injunction must issue, and in respect to the other and minor projections there may be a declaration establishing the right of the Commonwealth, but

not compelling the defendant to remove them at present, in view of its willingness and request to be allowed to retain them under the assent of the Commonwealth; both to be under the direction of a single justice."

REMOVAL OF WRECKS.

Some time last winter the schooner "E. Closson," with a cargo of lumber, was wrecked and abandoned on Green Island. The Boston Tow Boat Company set her afloat, towed her to an East Boston wharf, where her cargo was discharged, and then towed her on to the flats at Jeffrey's Point, East Boston, and abandoned her. April 13, 1892, the Columbian Rowing Association complained that the wreck was an obstruction to navigation and asked to have it removed. After investigation the Board notified the Boston Tow Boat Company to remove this wreck, and they did so within the time named by the Board.

On April 7, 1892, the sloop "Star," a ballast-lighter owned by Oscar Colson, loaded with granite chips, capsized on the southerly edge of the ship channel off the South Boston flats, and the cargo of about ninety tons was deposited on the bottom. It was considered to be a danger to navigation, and, as the owner did not have the means to remove it, the Board decided to do so at the expense of the Commonwealth. A contract was made with Mr. George W. Townsend, the lowest bidder, to remove the stone for the sum of \$194, and the work was completed and the bill approved May 26, 1892.

On April 27, 1892, the steamer "Philadelphian" ran into and sunk the fishing schooner "Lizzie Williams" in the centre of the upper middle channel in Boston harbor. The harbor master reported the matter to the Board and said that the wreck ought to be removed at once as it was a very dangerous obstruction to navigation. The Board at once notified the owners to remove the wreck before 3 o'clock P.M. April 29, 1892. The owners replied that the obstruction was caused through no fault of theirs, and, as the vessel was not worth the cost of removal, declined to remove it. They, however, after they had stripped the vessel of most of the sails and running rigging, gave a release to the Commonwealth of all their right, title and interest in the wreck,

and the Board proceeded to remove it. A contract* was made May 2, 1892, with Mr. George W. Townsend, to remove the vessel from the channel and on to the flats, for the sum of \$440. This was accomplished May 12, and a supplemental contract† was then made with Mr. Townsend to patch the hole in the vessel's side in order to remove her from the flats and put her afloat alongside the wharf on the South Boston flats, for the sum of \$175. This was successfully done on May 14. The Board then advertised for bids for the sale of the vessel as she lay afloat at the wharf and sold her to John Sullivan, the highest bidder, for the sum of \$82.50.

April 1, 1892, Miss Floretta Vining asked permission to remove a wreck which had been left on Stony Beach, adjoining her land in Hull, by Mr. Ralph W. Dean. May 2 the Board notified Mr. Dean to remove the wreck on or before May 9, 1892, and he did so.

In May, 1892, a pilot living on the island of Cuttyhunk found the wreck of the schooner "Francis Edwards" abandoned about fourteen miles off Vineyard Sound lightship. He had her towed to New Bedford harbor and grounded on the flats near Crow Island. The cargo was insured in a Maine insurance company, and their agent removed and sold the cargo, and after the vessel was stripped the hull was abandoned where it lay near Crow Island. After investigation the Board decided that the remedies given by the statute could not be effectively applied in this case, and requested Capt. W. H. Bixby of the United States engineer corps, U.S.A., the officer in charge of that district, to have the wreck removed by the United States Government. He replied that he would recommend such removal.

LICENSES AUTHORIZING STRUCTURES IN OR PRIVILEGES AFFECTING TIDE WATERS, GREAT PONDS AND THE CONNECTICUT RIVER GRANTED DURING THE YEAR 1892.

Nos.

1427. Petition of the city of Boston for license to dump snow and ice into tide waters in the cities of Boston, Cambridge and Chelsea. Granted Jan. 7, 1892.

* See Appendix E.

† See Appendix F.

1428. Petition of Dexter J. Cutter for license to fill solid on Mill Creek at Commercial Point in the city of Boston. Granted Jan. 14, 1892.
1429. Petition of Winchester Smith for license to fill solid a portion of two pile wharves and a portion of a dock in Salem harbor in the city of Salem. Granted Jan. 28, 1892.
1430. Petition of the county commissioners of the counties of Plymouth and Barnstable for approval of plans for building a bridge across Cohasset Narrows, between the towns of Wareham and Bourne, as authorized by chapter 408 of the Acts of 1891. Granted Jan. 28, 1892.
1431. Petition of the city of Haverhill for license to build a stone arch bridge across Little River in the city of Haverhill. Granted Jan. 28, 1892.
1432. Petition of the Battery Wharf Store Company for license to fill solid and rebuild a portion of Battery wharf in Boston harbor in the city of Boston. Granted Feb. 4, 1892.
1433. Petition of the Boston & Maine Railroad for license to rebuild the draw and widen the passageway for vessels in the Boston & Lowell freight bridge on Charles River in the cities of Boston and Cambridge. Granted Feb. 4, 1892.
1434. Petition of the Boston & Maine Railroad for license to rebuild the draw and widen the passageway for vessels in the Boston & Maine railroad bridge on Charles River in the cities of Boston and Cambridge. Granted Feb. 4, 1892.
1435. Petition of John Q. Adams and others, trustees of the Boston Real Estate Trust, for license to remove a portion of Ballard's wharf, to drive piles and dredge a dock in Boston harbor in the city of Boston. Granted Feb. 11, 1892.
1436. Petition of the Pilgrim Society of Plymouth for license to rebuild, widen and extend its wharf, and to fill solid a portion of a dock in Plymouth harbor in the town of Plymouth. Granted Feb. 11, 1892.
1437. Petition of Jones & Heald for license to draw water from Fawn Pond in the town of Plymouth. Granted Feb. 11, 1892.
1438. Petition of the Eastern Dredging Company for license to extend its wharf, partly solid and partly on piles, on Chelsea Creek in East Boston. Granted Feb. 18, 1892.

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1439. Petition of Edward Lane, trustee of the estate of Edward B. Lane, for license to fill solid in Salem harbor in the city of Salem. Granted Feb. 19, 1892.
1440. Petition of the Naumkeag Steam Cotton Company for license to build a sea-wall and fill solid in Salem harbor in the city of Salem. Granted Feb. 19, 1892.
1441. Petition of the North Packing and Provision Company for license to widen its wharf on piles on Miller's River in the city of Somerville. Granted Feb. 26, 1892.
1442. Petition of the board of county commissioners of Essex County for license to extend the draw-pier of the Merrimack River bridge in Newburyport harbor in the city of Newburyport. Granted Feb. 26, 1892.
1443. Petition of the Boston & Maine Railroad and the Boston & Albany Railroad Company for license to rebuild and widen the draw-pier of their bridge on piles on Mystic River in the town of Everett. Granted Feb. 26, 1892.
1444. Petition of George F. Proctor for license to build a wharf, partly solid and partly on piles, and to dredge in Chelsea Creek in the town of Revere. Granted March 17, 1892.
1445. Petition of the Winthrop Yacht Club for license to build a pile wharf in Crystal Cove in the town of Winthrop. Granted March 29, 1892.
1446. Petition of Frank S. Patch for license to widen his wharf on piles on Weymouth Fore River in the city of Quincy. Granted March 31, 1892.
1447. Petition of George F. Welch for license to widen and extend his wharf by filling solid in Scituate harbor in the town of Scituate. Granted March 31, 1892.
1448. Petition of the town of Hull for license to build a sewer outfall in Massachusetts Bay at Gun Rock in the town of Hull. Granted March 31, 1892.
1449. Petition of the Boston Water Board for license to lay a six-inch water pipe in Boston harbor between Squantum and Thompson's Island in the cities of Boston and Quincy. Granted April 5, 1892.
1450. Petition of Richard W. Pratt for license to widen and extend Johnson's wharf on piles on Mystic River in the city of Boston. Granted April 5, 1892.
1451. Petition of Oscar Dubois for license to build a pile wharf in Mount Hope Bay in the city of Fall River. Granted April 21, 1892.

1452. Petition of William P. Clyde & Co. for license to build a pile wharf in Lynn Bay in the town of Nahant. Granted April 28, 1892.
1453. Petition of the Boston Asylum and Farm School for Indigent Boys for license to extend its wharf on piles in Boston harbor at Thompson's Island in the city of Boston. Granted April 28, 1892.
1454. Petition of the Boston & Maine Railroad for license to build a new abutment at the westerly end of Squam River bridge on Squam River in the city of Gloucester. Granted May 19, 1892.
1455. Petition of the Thomson-Houston Electric Company for license to build a wharf, partly solid and partly on piles, and to dredge in Saugus River in the city of Lynn. Granted May 19, 1892.
1456. Petition of George M. Smith for license to extend his wharf on piles on Charles River in the city of Cambridge. Granted May 20, 1892.
1457. Petition of the Jewett Lumber Company for license to fill solid on Chelsea Creek at East Boston. Granted May 20, 1892.
1458. Petition of the town of Newbury for approval of plans for a wharf at the public landing of said town on the River Parker, as authorized by chapter 272 of the Acts of 1892. Granted May 20, 1892.
1459. Petition of the town of Revere for license to build a box out-fall sewer in Broad Sound at Cherry Island Bar in the town of Revere. Granted May 20, 1892.
1460. Petition of the Boston & Maine Railroad for license to build an addition to the draw-pier of the Boston & Maine railroad bridge on Charles River in the cities of Boston and Cambridge. Granted May 20, 1892.
1461. Petition of the Boston & Lowell Railroad Corporation for license to build pile platforms on Mystic River in the city of Boston, as authorized by chapter 309 of the Acts of 1887. Granted May 24, 1892.
1462. Petition of William O. Cutter for license to build a pile wharf in Buzzard's Bay at Monument Beach in the town of Bourne. Granted June 3, 1892.
1463. Petition of the Edison Electric Illuminating Company for license to extend Liverpool wharf on piles on Fort Point channel in Boston harbor. Granted June 3, 1892.
1464. Petition of John L. Batchelder, trustee, for license to

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- widen his wharf on piles on Fort Point channel in Boston harbor. Granted June 3, 1892.
1465. Petition of the town of Dennis for license to fill solid a portion of a bridge across Swan Pond River in the town of Dennis. Granted June 3, 1892.
1466. Petition of the city of Cambridge for license to build two dolphins in Broad Canal near First Street bridge in the city of Cambridge. Granted June 3, 1892.
1467. Petition of Alvarado A. Coburn for license to build and maintain a boat-house and floats in Lake Quinsigamond in the city of Worcester. Granted June 3, 1892.
1468. Petition of the Quinsigamond Lake Steamboat Company for license to build and maintain wharves in Lake Quinsigamond in the city of Worcester and town of Shrewsbury. Granted June 3, 1892.
1469. Petition of George M. Smith for license to extend his wharf on piles on Charles River in the city of Cambridge. Granted June 9, 1892.
1470. Petition of Joseph Jefferson for license to build and maintain a boat-landing and float in Buttermilk Bay in the town of Bourne. Granted June 9, 1892.
1471. Petition of Nathaniel M. Safford for license to extend his wharf, partly solid and partly on piles, on Weymouth Fore River in the town of Weymouth. Granted June 10, 1892.
1472. Petition of John B. Rhines for license to extend his wharf on piles on Weymouth Fore River in the town of Weymouth. Granted June 10, 1892.
1473. Petition of the city of Gloucester for license to widen Essex Avenue in tide water in the city of Gloucester. Granted June 16, 1892.
1474. Petition of the Board of Metropolitan Sewerage Commissioners for approval of plans for building a sewer in tide water flowing into Mystic River in the town of Medford, as authorized by chapter 439 of the Acts of 1889. Granted June 16, 1892.
1475. Petition of Moses W. Mann and Elizabeth J. C. Mann for license to build a sea-wall, bulkhead and boat-house, and to fill solid on Mystic River in the town of Medford. Granted June 16, 1892.
1476. Petition of the Taunton Boat Club Corporation for license to build a boat-house on piles on Taunton River in the city of Taunton. Granted June 23, 1892.

1477. Petition of Augustus J. Richards for license to extend his wharf on piles on Weymouth Fore River in the town of Weymouth. Granted June 23, 1892.
1478. Petition of the Plymouth Foundry Company for license to build a bulkhead and fill solid in Plymouth harbor in the town of Plymouth. Granted June 23, 1892.
1479. Petition of the Connecticut River Railroad Company for license to build an embankment or wall and fill solid on the Connecticut River in the city of Chicopee. Granted June 23, 1892.
1480. Petition of the city of Boston for license to build retaining walls and fill solid in Boston harbor at L Street near the reserved channel at South Boston. Granted June 30, 1892.
1481. Petition of the Walworth Manufacturing Company for license to build a sea-wall or bulkhead and fill solid in Boston harbor near the reserved channel at South Boston. Granted June 30, 1892.
1482. Petition of Daniel Doherty for license to build a bulkhead, pile platform and pier, to fill solid and dredge in Dorchester Bay in the city of Boston. Granted July 7, 1892.
1483. Petition of Charles H. Boynton for license to extend his wharf on piles in Gloucester harbor in the city of Gloucester. Granted July 8, 1892.
1484. Petition of the city of Boston for license to build an embankment from Squantum to the east shaft of the tunnel in Dorchester Bay in the city of Quincy. Granted July 15, 1892.
1485. Petition of the towns of Arlington and Medford for license to rebuild the bridge over Mystic River at High Street in Medford and Medford Street in Arlington. Granted July 21, 1892.
1486. Petition of the board of county commissioners of Essex County for approval of plans for two additional piers at Rocks bridge on the Merrimack River between the city of Haverhill and the town of West Newbury, as authorized by chapter 119 of the Acts of 1892. Granted July 28, 1892.
1487. Petition of the city of Boston for license to drive piles in Boston harbor for a foundation at the southerly drop of the North ferry in East Boston. Granted Aug. 4, 1892.
1488. Petition of Daniel Doherty for license to extend his wharf, partly solid and partly on piles, and dredge in Dorchester Bay in the city of Boston. Granted Aug. 11, 1892.

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1489. Petition of E. P. Crooker for license to build a marine railway on piles in Manchester harbor in the town of Manchester. Granted Aug. 11, 1892.
1490. Petition of Jesse Tirrell for license to extend his wharf on piles on Fort Point channel in Boston harbor. Granted Sept. 1, 1892.
1491. Petition of James G. Young, Jr., for license to build and maintain a pile wharf and float in Onset Bay in the town of Wareham. Granted Sept. 1, 1892.
1492. Petition of Josiah C. Bennett for license to fill solid in Lynn harbor in the city of Lynn. Granted Sept. 16, 1892.
1493. Petition of the Boston Asylum and Farm School for Indigent Boys for license to place two dolphins and build a boat-house on piles in Boston harbor at and near Thompson's Island in the city of Boston. Granted Sept. 16, 1892.
1494. Petition of the city of Cambridge for license to rebuild and widen a portion of Western Avenue bridge on piles on Charles River in the city of Cambridge. Granted Sept. 16, 1892.
1495. Petition of the town of Watertown for license to rebuild and extend the west abutment of Arsenal Street bridge on Charles River in the town of Watertown. Granted Sept. 22, 1892.
1496. Petition of the town of Beverly for license to build and maintain a pile bridge on Bass River, and to lay a twelve-inch water pipe in and under said river in the town of Beverly. Granted Sept. 22, 1892.
1497. Petition of the Boston Water Board for license to lay a temporary water pipe in Boston harbor from Long Island to Gallop's Island in the city of Boston. Granted Sept. 22, 1892.
1498. Petition of Joseph Story and others for license to extend and maintain a portion of Slate wharf on piles on Charles River in the city of Boston. Granted Sept. 29, 1892.
1499. Petition of the Board of Metropolitan Sewerage Commissioners for approval of plans for a sewer, siphon, pumping station and wharf on Chelsea Creek in the cities of Boston and Chelsea, as authorized by chapter 439 of the Acts of 1889. Granted Sept. 29, 1892.
1500. Petition of Martin B. Inches for license to widen and extend Russia wharf, partly solid and partly on piles, and

- to dredge in Fort Point channel in Boston harbor. Granted Oct. 5, 1892.
1501. Petition of the Proprietors of Liverpool wharf for license to fill solid a portion of Pearl Street wharf, to widen and extend said wharf, partly solid and partly on piles, and to dredge in Fort Point channel in Boston harbor. Granted Oct 5, 1892.
1502. Petition of the Edison Electric Illuminating Company for license to fill solid a portion of Liverpool wharf and dredge in Fort Point channel in Boston harbor. Granted Oct. 5, 1892.
1503. Petition of the Chadwick Lead Works for license to build a sea-wall and fill solid on Forest River in the city of Salem. Granted Oct. 6, 1892.
1504. Petition of Isaac C. Wyman for license to fill solid on Forest River in the city of Salem. Granted Oct. 6, 1892.
1505. Petition of George H. Earl for license to build a dike across Toad's Hole Creek in the town of Wareham. Granted Oct. 20, 1892.
1506. Petition of the Winthrop Yacht Club for license to build a club-house on piles and to place floats in Crystal Cove in the town of Winthrop. Granted Oct. 25, 1892.
1507. Petition of the Jamaica Pond Ice Company for license to build an embankment, a portion of an ice-house, and a pile structure in Massapoag Pond in the town of Sharon. Granted Nov. 3, 1892.
1508. Petition of the Boston, Revere Beach & Lynn Railroad Company for license to rebuild its "Wood Island" bridge on piles in Boston harbor at East Boston. Granted Nov. 7, 1892.
1509. Petition of the West End Street Railway Company for license to dump snow and ice from bridges and wharves into tide waters in the cities of Boston, Cambridge and Chelsea and the town of Medford. Granted Nov. 10, 1892.
1510. Petition of the Union Freight Railroad Company for license to dump snow and ice from Constitution wharf into Boston harbor in the city of Boston. Granted Nov. 10, 1892.
1511. Petition of the city of Boston and town of Watertown for license to rebuild the pile structure and draw of Western Avenue bridge on Charles River in the city of Boston and town of Watertown. Granted Nov. 11, 1892.

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1512. Petition of the city of Boston for license to build a sea-wall and to dredge in Roxbury Canal in the city of Boston. Granted Nov. 11, 1892.
1513. Petition of William James, Jr., for license to extend a wharf by filling solid in Hull Bay in the town of Hull. Granted Nov. 17, 1892.
1514. Petition of the Southbridge, Sturbridge & Brookfield Railroad Company for license to build a bridge across Podunk Pond in the town of Brookfield. Granted Nov. 23, 1892.
1515. Petition of the Gay Head Clay and Brick Company for license to build a pile wharf in Vineyard Sound in the town of Gay Head. Granted Nov. 23, 1892.
1516. Petition of Thomas L. Sturtevant for license to build a boat-house on piles and to dredge in Weymouth Fore River in the city of Quincy. Granted Nov. 23, 1892.
1517. Petition of the George Lawley & Son Corporation for license to extend a pier on piles, to build a bulkhead and to dredge a basin in Boston harbor near the reserved channel at South Boston. Granted Nov. 23, 1892.
1518. Petition of Isaiah Spindell for license to build a sea-wall and fill solid in Woods Holl Great harbor at Woods Holl in the town of Falmouth. Granted Dec. 2, 1892.
1519. Petition of the Pintsch Compressing Company for license to lay a one and one-quarter inch hose across the draw-way in the Boston & Lowell railroad passenger bridge on Charles River in the cities of Boston and Cambridge. Granted Dec. 2, 1892.
1520. Petition of the board of county commissioners of Bristol County for approval of plans for a bridge across Cole's River in the town of Swanzey, as authorized by chapter 301 of the Acts of 1890. Granted Dec. 8, 1892.
1521. Petition of the Standard Oil Company of New York for license to build a bulkhead and dolphins, to fill solid and dredge in Chelsea Creek at East Boston. Granted Dec. 8, 1892.
1522. Petition of Asa Shiverick for license to build a sea-wall and fill solid in Eel Pond at Woods Holl in the town of Falmouth. Granted Dec. 12, 1892.
1523. Petition of Eugene H. Brann for license to build a pile wharf in Lynn Bay in the town of Nahant. Granted Dec. 15, 1892.
1524. Petition of the Edison Electric Illuminating Company for license to extend Dolbeare's wharf by filling solid on

Fort Point channel in Boston harbor. Granted Dec. 15, 1892.

1525. Petition of the Edison Electric Illuminating Company for license to further extend Dolbeare's wharf by filling solid on Fort Point channel in Boston harbor. Granted Dec. 15, 1892.
1526. Petition of the town of Medford for license to build a conduit in the Mill Pond and Mystic River in the town of Medford. Granted Dec. 22, 1892.
1527. Petition of John T. Scully and Michael M. Cuniff for license to fill flats on Charles River in the city of Cambridge. Granted Dec. 29, 1892.
1528. Petition of the Cottage City Water Company for license to build a pile wharf in the Lagoon in the town of Cottage City. Granted Dec. 29, 1892.
1529. Petition of Walter O. Luscombe for license to widen his wharf on piles in Woods Holl Great harbor at Woods Holl in the town of Falmouth.
1530. Petition of William F. Stanly for license to fill solid in Dunham Pond in the town of Carver. Granted Dec. 29, 1892.

Of the foregoing licenses, Nos. 1444, 1461, 1499, 1500, 1501, 1502 and 1521 were granted to authorize structures extending beyond the harbor lines approved by the Secretary of War, and were made subject to the laws of the United States in respect to harbor lines. In order to give them validity the approval of the Secretary of War was necessary, and this was subsequently given in each of the cases named, except the last which has not yet been presented to him.

APPLICATIONS FOR LICENSES REFUSED, WITHDRAWN OR POSTPONED.

Filed Feb. 4, 1892, petition of James L. Little and others, executors and trustees under the will of James L. Little, deceased, for a license to construct an iron fence between high and low water over the rocks of the petitioners at Phillips Point in the town of Swampscott. Hearings were given in this case on Feb. 18 and 25 and March 3, 1892. On March 9, 1892, the commissioners inspected the premises. On March 17, 1892, the Board refused to grant the license for the reasons given in a written opinion printed in the Appendix to this Report and marked [G].

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Filed Feb. 24, 1892, petition of the Fall River Iron Works Company for a license to build a wharf on Taunton River in the city of Fall River. Hearings given on March 10, 17 and 31, 1892. On April 14, 1892, the petition was withdrawn by the petitioner.

Filed on March 24, 1892, petition of the town of Nantucket for a license to build a tank for the reception of sewage and pipes and other structures connected therewith upon the beach in Nantucket harbor. Hearing given March 31, 1892. April 1, 1892, the Board voted that action be deferred on the ground that the town was not yet ready to proceed with the construction of the sewer requiring the tank which the Board was asked to license.

Filed June 30, 1892, petition of the Roxbury Central Wharf for a license to fill solid certain lands and flats on the South Bay in the city of Boston. Hearing given July 14, 1892. On July 28, 1892, the Board decided, with the assent of the petitioner, not to grant the license, but stated that they would entertain and consider a petition from the corporation to improve the lands and flats in question whenever said corporation has definitely decided upon its plan of improvement.

Filed July 14, 1892, petition of Joseph T. McFarlin and Thomas C. Swift for a license to take water from Sampson's Pond in the town of Carver for the purpose of flowing a cranberry bog. Hearing given July 28, 1892. The riparian owners and others using the waters of the pond objected to the granting of the license. Aug. 11, 1892, license refused.

Filed July 28, 1892, petition of Augustus Hemenway for a license to build a marine railway in Beverly harbor. Hearing given Aug. 4, 1892, and petition withdrawn on that day.

Filed Aug. 25, 1892, petition of Annie M. Oakes for a license to fill solid a dock on Chelsea Creek in the city of Chelsea beyond the United States bulkhead line. Hearing given Sept. 1, 1892. Sept. 8, 1892, the Board voted not to grant the license, but the petitioner was informed that the Board were willing to grant a license for a pile structure in other respects similar to that designated on the plan.

Filed on Sept. 29, 1892, petition of Nathaniel C. Bartlett for a license to erect a building adjoining Locke Street over Little River in the city of Haverhill. Hearing given Oct. 6, 1892. The granting of the license was opposed by the city of Haverhill and also by the owners of the land upon the opposite side of the river. License refused.

Filed Sept. 29, 1892, petition of George H. Earl and Benjamin Waters for a license to take water from Clear Pond in the town of Carver for the purpose of flowing a cranberry bog. Hearings given on Oct. 6 and Nov. 10, 1892. On Oct. 26, 1892, the Board visited Clear Pond and inspected the premises. On Nov. 10, 1892, the Board decided to defer action until the water in said pond is high enough to enable them to determine in a satisfactory manner the rights of the parties and the possibilities of the use of the water of the pond by them.

Filed Oct. 6, 1892, petition of Rufus A. Crowell for a license to take water from Atwood's Pond in the town of Carver, for the purpose of flowing a cranberry bog. Hearing given Oct. 20, 1892. On Oct. 27, 1892, license refused.

Filed Oct. 27, 1892, petition of Robert Gould for a license to erect on a beach at Hull supports for his bulkhead on said beach. Hearing given Nov. 10, 1892. Nov. 17, 1892, license refused on the ground that, in the judgment of the Board, Mr. Gould can accomplish his purposes by building structures wholly above high-water line.

MISCELLANEOUS PERMITS.

In addition to the licenses already mentioned as granted by the Board during the year, there were also granted eighteen miscellaneous permits for other purposes, such as for dredging, for dumping material at certain places under proper restrictions, for taking gravel from flats belonging to the Commonwealth, for taking stones from certain beaches for certain purposes under proper restrictions, for placing temporary moorings in Boston harbor and for authorizing the publication of certain notices in the name of the Board.

TIDE-WATER ASSESSMENTS.

From tide-water assessments under licenses granted by the Board there was paid into the treasury of the Commonwealth during the year 1892 the sum of \$5,908.72. These assessments were all made in Boston harbor, and the money paid is accordingly reserved under the provisions of section 14 of chapter 19 of the Public Statutes as part of the compensation fund which may be used and expended from time to time under the direction of the Board for the improvement of that harbor. This fund forms a valuable means of

supplementing the work done by the United States authorities for the improvement of the harbor, especially when, as from time to time must occur, improvements are required which cannot be regarded as properly pertaining to international or interstate commerce and are therefore not chargeable to the United States government.

RECEIPTS FROM GRANTS OF PUBLIC LANDS.

The amount received during the past year for grants of rights and privileges in lands of the Commonwealth under licenses from this Board for filling and for the erection of wharves and other structures in and over tide waters and great ponds is \$11,101. Other like assessments to the amount of \$21,602.80 have been made during the year for which the money has not yet been paid into the treasury. The payment for such grants was first required by chapter 284 of the Acts of 1874, now section 16 of chapter 19 of the Public Statutes. Since the passage of that act the total amount so received and paid into the treasury of the Commonwealth has been \$289,202.40.

In addition to the payments above named, \$750.30 has been received for gravel dredged from the flats of the Charles River under a permit granted by the Board, \$50 was paid as rent under the lease of Hangman's Island and \$50 more is now due for such rent.

The amounts received from sales and leases of the Commonwealth's lands at the South Boston flats have already been stated in the portion of this report relating to that subject. The amount received for the release from a restriction of certain land on Boylston Street has also been stated under the head of Back Bay Lands.

LEGISLATION DURING THE YEAR ON MATTERS RECOMMENDED BY THE BOARD IN PREVIOUS REPORTS.

The Legislature of 1892 passed an act to protect the shores and beaches of Boston harbor in accordance with the recommendations of this Board contained in their annual report for 1891.

An act was also passed increasing the penalty for the un-

authorized removal of sand, gravel and other material from beaches, and an act to protect the beaches and shores of the town of Marblehead.

The Board have several times during the year been called upon to exercise the jurisdiction conferred upon them by these and similar statutes.

An act was also passed by the Legislature of 1892 establishing a boundary line in tide-water between the city of Gloucester and the towns of Essex and Ipswich. Although the line as finally established by the Legislature was not precisely that recommended by the Board in their report for 1890, the legislation was satisfactory to the Board for the reason that the important point was to have the line established somewhere.

APPOINTMENTS BY THE BOARD.

During the year the Board made the following appointments: Mr. D. Koppmann, to be consulting engineer of the Board; Mr. Frank W. Hodgdon, to be engineer of the Board; Mr. Frederick N. Wales, to be clerk of the Board.

The foregoing Report is respectfully submitted by

HENRY W. SWIFT,
JOHN I. BAKER,
CHARLES H. HOWLAND,
Commissioners.

Boston, Jan. 1, 1893.

STATEMENT

OF

LIEUT. COL. S. M. MANSFIELD, CORPS OF ENGINEERS, U. S. A.

[Referred to in the foregoing Report of the Board.]

DEC. 23, 1892.

The Board of Harbor and Land Commissioners of Massachusetts.

GENTLEMEN:—In accordance with your request of even date, I have the honor to furnish the following summary of the work done by the government during the year 1892, in those rivers and harbors of Massachusetts which are under my charge:—

1. *Newburyport Harbor.*

The general project for the improvement of this harbor has not been changed.

The two jetties and the Plum Island dike are in the same condition as at the date of my last report, no work having been done during the year.

A contract is now in force with Geo. Willett Andrews to deposit 15,000 tons of rubble stone in the north jetty, and this work will probably be commenced early in the year 1893.

The annual survey of the bar was made in June, 1892. It showed that the channel across the bar had straightened, widened and deepened since the survey of 1891. It is not less than 13.1 feet deep at mean low water in a navigable channel at least 200 feet wide.

2. *Harbor of Refuge, Sandy Bay.*

The project for the construction of this breakwater was changed during the year. It is now proposed to construct the entire breakwater of rubble stone.

Five hundred and fifty-one thousand tons of stone have been deposited in the breakwater, and no part of it has as yet appeared above water; but under the existing contract with the Rockport

and Pigeon Hill Granite companies, it is expected that 500 feet of the breakwater will be fully completed.

3. *Gloucester Harbor.*

No change has been made in the project for the improvement of this harbor, and no work was done during the year.

A contract is now in force with the National Dredging Company to dredge 150,000 cubic yards, under which it is expected to finish all the proposed dredging, and thus complete the improvement, with the exception of the removal of some small ledges uncovered by the dredging, and the building of the breakwater from Eastern Point.

4. *Manchester Harbor.*

No change has been made in the project, and no work has been done during the year.

A contract is in force with Mr. Edgar P. Lovering to dredge 22,222 cubic yards, by which it is expected to complete the improvement by June 30, 1893.

5. *Salem Harbor.*

No change in the project has been made.

During the year 10 cubic yards of ledge, uncovered by dredging, were removed from the improved channel near Derby Wharf Light.

A contract is now in force with Mr. Augustus R. Wright to dredge 40,000 cubic yards, by which it is expected to complete the improvement during the year 1893.

6. *Lynn Harbor.*

The project has been enlarged to include the improvement of the western or Saugus River channel, so that 8 feet can be carried at mean low water in a channel 150 feet wide.

A contract is in force with Messrs. Boynton Bros. for this work and the continuation of the improvement of the main ship channel, and 40,000 cubic yards will be dredged during the year 1893.

7. *Winthrop Harbor.*

The project for the improvement of this harbor proposes a channel 3,900 feet long, 50 feet wide and 6 feet deep at mean low water, from deep water to Rice's wharf. The present improved channel is 3,900 feet long, 35 feet wide and 3 feet deep.

A contract is in force with Mr. O. E. Lewis to complete the improvement on or before June 30, 1893.

8. *Boston Harbor.*

The project for the improvement of this harbor has been enlarged. It is now proposed to widen and deepen the main ship channel so that it shall be 1,000 feet wide and 27 feet deep at mean low water.

During the year 1892 repairs were made to the sea-wall at Great Brewster Island.

The main ship channel was widened at the Upper Middle so that now it is 850 feet wide, 23 feet deep at mean low water.

Twenty thousand six hundred and ninety-seven cubic yards were dredged from the Jeffrey's Point Channel.

The channel between Nix's Mate and Long Island was completed. It is now 300 feet wide, 15 feet deep at mean low water.

No work has been done in Charles River.

Contracts are in force as follows:— With Augustus B. Martin to deepen the channel leading to Nantasket Beach, so that it will be 12 feet deep at mean low water; with Chas. H. Souther to complete the Jeffrey's Point Channel; and with Chas. H. Souther and Augustus R. Wright to dredge 500,000 cubic yards from the main ship channel, and thus give an improved channel from the entrance of the harbor to the anchorage west of Georges Island, 27 feet deep at mean low water, 1,000 feet wide to Bug Light, and thence 800 feet wide.

9. *Hingham Harbor.*

About 100 cubic yards of rock were removed from the ledge between Chandler's and Ragged islands, under a contract with Mr. George W. Townsend. The work under this contract will be finished early in 1893, and the project thus completed.

10. *Scituate Harbor.*

About 150 feet of the south breakwater were completed under a contract with Mr. Joseph H. White, by which it is expected to build about one-half of the projected length of this breakwater during the year 1893.

11. *Plymouth Harbor.*

A contract is in force with the National Dredging Company to dredge 12,000 cubic yards from the main channel, and thus complete the proposed improvement.

No works of preservation were built on Long Beach, but funds are available therefor, and certain necessary repairs and extension of the bulkheads on this beach will be made early in 1893.

12. *Kingston Harbor.*

The project for the improvement of this harbor proposes to dredge a channel 4,000 feet long, 100 feet wide, 6 feet deep at mean low water, from deep water to the wharf at North Plymouth.

A contract to complete this work is now in force with the National Dredging Company, and it will be done early in 1893.

13. *Wellfleet Harbor.*

No change has been made in the project, and no work has been done during the year.

14. *Provincetown Harbor.*

No repairs or extensions of the works protecting this harbor were made.

15. *Chatham Harbor.*

No change was made in the project, and no work has been done during the year.

16. *Merrimac River.*

Operations for the removal of "The Boilers" to a depth of 5 feet at mean low water, thus completing the proposed improvement, were commenced during the latter part of the year, under a contract with Sturgis & Andrews. During the year 75 yards of ledge were removed.

17. *Powow River.*

No operations were in progress, as the expenditure of the available funds would produce no appreciable benefit to commerce.

18. *Ipswich River.*

A contract is in force with Mr. Edgar P. Lovering to dredge 6,000 cubic yards from "The Shoals" and the channel above, thus completing the improvement, as at present projected.

19. *Weymouth River.*

No operations were in progress. The work was advertised, but satisfactory prices were not offered.

20. *Mystic River.*

The project for the improvement of this river proposes a channel 100 feet wide and 6 feet deep at mean low water to the first turn above Denning's wharf, and thence to the head of navigation, 4 feet deep, with the width gradually reduced to 50 feet at Cradock Bridge.

No operations were in progress. The work was advertised, but satisfactory prices were not bid.

21. Malden River.

The project for the improvement of this river proposes to make the natural channel of the river 100 feet wide to the first bridge, and thence 75 feet wide to the second bridge, 12 feet deep at mean high water.

No operations were in progress during the year, as the expenditure of the available funds would produce no benefit to commerce.

22. Examinations.

Examinations were made, and reports thereof submitted, for the following localities: Gloucester Harbor, from Five Pound Island to head of the river; Vincent Cove, Gloucester Harbor; Saugus River; East Boston Channel, from Narrow Gauge Railroad to Jeffrey's Point; Chelsea Creek; Neponset River.

Very respectfully, your obedient servant,

S. M. MANSFIELD,

Lieutenant Colonel of Engineers.

STATEMENT

OF

CAPT. W. H. BIXBY, CORPS OF ENGINEERS, U. S. A.

[Referred to in the foregoing Report of the Board.]

Abstract of work done in Massachusetts, under direction of Capt. Wm. H. Bixby, corps of engineers, during the fiscal year ending June 30, 1892, with brief notes as to subsequent work:—

Taunton River.

The approved project of 1880, as modified in 1888, provides for the widening and deepening of the river so as to secure a channel of at least 12 feet depth at high water with 100 feet width from its mouth up to Berkley Bridge (above Dighton); thence 12 feet depth with 80 feet width (100 feet width at bends) up to Briggs Shoal; thence 11 feet depth with 80 feet width up to the ship yard; thence 11 feet depth with 60 feet width up to Weir bridge, Taunton; all at a total cost estimated in 1888 at \$108,000, of which \$101,000 was appropriated prior to June 30, 1892.

A plan of the works may be found at page 606, annual report of the chief of engineers for 1884; and a later more detailed plan in House Ex. Doc., No. 86, of the fiftieth Congress, first session; and further information at page 373 of the annual report of 1880, and page 519 of 1888.

At the adoption of the present project the channel was limited to 9 feet at high water, and was too narrow, and too much obstructed by bowlders for easy navigation by the craft making use of it.

During the last fiscal year work was carried on between Pioneer Rock and the Needles; 2,650 cubic yards of sand and bowlders were removed. Work was stopped July 31, 1892.

As a result of all work up to June 30, 1892, a large part of the

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proposed project has been completed, especially at the places most complained of by the vessels using this river.

There was on June 30, 1892, \$18.72 available for the continuance of work; since then \$7,000 has been appropriated by act of July 13, 1892. This has been all spent in work, which was resumed Sept. 13 and stopped Nov. 28, 1892. Work was carried on at the Needles, Briggs Shoal, the reach below Three-mile River and at Burt's Turn. The work on this river is very nearly completed.

Hyannis Harbor.

The approved project of 1884 provides for the dredging to 15.5 feet depth at low water of about 34 acres of shoal area north of the existing breakwater, so as to increase the deep water harborage by that amount; all at a total cost estimated in 1884 at \$46,743.20 (including \$81.20 left over from a former project), of which \$28,081.20 was appropriated prior to June 30, 1892.

A plan of the works may be found at page 560, annual report of the chief of engineers for 1885; and further information at page 621 of 1885.

At the adoption of the present project the 15.5 feet depth anchorage covered only about 47 acres, and the 34 additional acres to be dredged carried an average of about 12 feet depth of water at low water.

During the last fiscal year comparatively little work was done; 6,360 cubic yards were excavated, increasing the 15½ foot anchorage by 1.1 acres in area.

As a result of all work up to June 30, 1892, 11 acres out of 34 have been dredged.

There were on June 30, 1892, no funds available; but since then \$6,000 has been appropriated by act of July 13, 1892, to continue the work. No further work has been done up to Dec. 31, 1892.

Nantucket Harbor.

The approved project of 1880, as modified in 1885, provides for the construction of two jetties, as training walls, one on each side of the harbor entrance, planned so as to allow the tidal current to assist in scouring out and maintaining a good channel; and for the completion of the work by dredging where necessary to obtain a depth of 15 feet at low water in this channel; all at a total cost estimated in 1885 at \$375,000, of which \$170,000 was appropriated prior to June 30, 1892.

A plan of the works may be found at page 578, annual report of the chief of engineers for 1885.

At the adoption of the present project no jetties existed; and the channel entrance was barred by a shoal of 1.5 miles width, on which there was only 6 feet depth of water at low tide.

During the last fiscal year 1,300 feet of the east jetty was completed up to half tide level; 7,146 tons of stone were put in this work. The channel is deepening and moving to the eastward.

As a result of all work up to June 30, 1892, the west jetty has been built to 3,955 feet length with full height; the east jetty has been built to 834 feet length with full height, then comes a gap of 160 feet, and then 1,300 feet length raised to half tide level.

There were on June 30, 1892, no funds available for the continuance of work; but since then \$25,000 has been appropriated by act of July 13, 1892. No further work has been done up to Dec. 31, 1892.

Edgartown Harbor.

The approved project of 1889 provides for the removal to 10 feet depth, at low water, of a "middle ground" shoal in the central part of the inner harbor; all at a total cost estimated in 1889 at \$4,500, of which \$2,000 was appropriated prior to June 30, 1892.

A description of the works may be found at page 588, annual report of the chief of engineers for 1890; and a plan of the same in House Ex. Doc., No. 59, of the fifty-first Congress, first session.

At the adoption of the present project the middle ground shoal carried only about 6 feet depth of water, and was a very troublesome obstruction.

During the last fiscal year about half of this shoal has been dredged, 15,385 cubic yards of sand having been excavated.

As a result of all work up to June 30, 1892, about one-half of the shoal has been dredged to full depth.

There was on June 30, 1892, \$54.60 available for continuance of work; but since then \$2,500 was appropriated by act of July 13, 1892. No further work has been done up to Dec. 31, 1892.

Vineyard Haven Harbor.

The approved project of 1887, as modified in 1889, provides for the protection of the "Chops" (or headlands) from erosion, and the intervening harbor from being filled by the eroded material; the whole to be done by means of stone sea-walls and jetties, to be built along the beach in front of the bluffs at both headlands; all at a total cost estimated in 1882 at \$60,000, of which \$35,000 was appropriated prior to June 30, 1892.

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A description of the work may be found at page 594, annual report of the chief of engineers for 1882, page 577 of 1887, and page 612 of 1889.

At the adoption of the present project the headlands were gradually wearing away, and the adjacent parts of the harbor were shoaling. No protection works were in existence.

During the last fiscal year about 3,386 tons of stone have been put in the work. On the East Chop the wall was carried about 300 feet east and 175 feet west of the jetty at the light-house. On the West Chop jetty No. 1 was extended 146 feet, and the longitudinal wall was extended to a point 400 feet east of jetty No. 3. A breakwater 60 feet long was built, to protect vessels landing stone. About one-half the needed work has been done.

As a result of all work up to June 30, 1892, there has been constructed a sea-wall of 450 feet length and a jetty of 50 feet length, at the East Chop; and a sea-wall of 400 feet length, 3 jetties of from 80 to 296 feet length, a wharf, and a short breakwater of 60 feet length, at the West Chop.

There was on June 30, 1892, \$51.28 available for continuance of work; but since then \$7,500 has been appropriated by act of July 13, 1892. No further work has been done up to Dec. 31, 1892.

Wareham Harbor.

The approved project of 1880, as modified in 1887, provides for the deepening and widening of the channel from Buzzard's Bay to Wareham, so as to obtain 10 feet depth at low water over to 250 feet width from the entrance up to Barney's Point, and thence the same depth over 350 feet width up to Wareham; and for the raising and protecting of Long Beach (the eastern headland of the entrance) so as to prevent the erosion of this beach and the shoaling of the adjacent parts of the channel and harbor; all at a total cost estimated in 1887 at \$56,236, of which \$49,000 was appropriated prior to June 30, 1892.

A plan of the works may be found at page 586, annual report of the chief of engineers for 1885; and further information at page 550 of 1881, and page 542 of 1887.

At the adoption of the present project the headland of Long Beach was wearing off and the adjacent parts of the channel and harbor were shoaling, the channel depth being limited to 9 feet at low water.

During the last fiscal year 7,292 cubic yards of mud and sand were excavated above Barney's Point, in widening and deepening the narrowest portions.

As a result of all work up to June 30, 1892, the channel has been deepened to half width and full depth of 10 feet in its upper portion, and to less width in its lower portions, and the sand spit has been partly protected by catch sand-fences and brush and stone work.

On June 30, 1892, there was \$374.56 available for continuance of work; but since then \$7,236 has been appropriated by act of July 13, 1892. Since then, up to Dec. 31, 1892, there has been excavated 1,508 cubic yards of mud, etc., above Barney's Point.

New Bedford Harbor.

The approved project of 1887 provides for the deepening, widening and straightening of the channel from Buzzard's Bay to New Bedford, so as to obtain 18 feet depth at low water over 200 feet width and over its entire length; all at a total cost estimated in 1887 at \$35,000, of which \$20,000 was appropriated prior to June 30, 1892.

A description of the works may be found at page 514, annual report of the chief of engineers for 1888; and a plan of the same in House Ex. Doc., No. 86, of the fiftieth Congress, first session.

At the adoption of the present project the channel was winding, and only about fifteen feet deep.

During the last fiscal year 28,720 cubic yards were dredged from the channel, increasing it from 100 feet in width to 166 feet for a length of 1,000 feet, and to 133 feet width, for a further distance of 1,060 feet, depth 18 feet.

As a result of all work up to June 30, 1892, the straight channel has been completed to 15 feet depth with 80 feet width over its entire length, on its western side; and a slightly crooked channel of 80 feet width with 18 feet depth also exists over the same distance, wandering a little from the projected channel.

There was on June 30, 1892, \$249.07 available for the continuance of work; since then \$75.00 has been appropriated by act of July 13, 1892. No further work has been done up to Dec. 31, 1892.

Westport Harbor.

The approved project of 1888 provides for the improvement of the channel from the Atlantic Ocean up the West branch to Adamsville, and up the East branch to Westport Point, so as to secure and maintain a channel depth of 7 feet at low water over its entire length, by dredging on the "Lion's Tongue" shoal if necessary; and for the protection of Horse Neck Point (the eastern headland

of the entrance) so as to prevent the erosion of this Point and the shoaling of the adjacent parts of the channel and harbor ; all at a total cost estimated in 1888 at \$2,000, of which \$1,000 was appropriated prior to June 30, 1892.

A description of the work may be found at page 645, annual report of the chief of engineers for 1889.

At the adoption of the present project Horse Neck Point was gradually wearing away, and the adjacent parts of the channel and harbor were shoaling.

During the last fiscal year the jetty formerly built and partially destroyed by storms was rebuilt by stone and brush ; 230 tons of stone were put in the work, making the jetty 150 feet long.

As a result of all the work up to June 30, 1892, the headland has been protected by one jetty, 150 feet long, made of brush and stone.

There was on June 30, 1892, \$337.81 available for the continuance of work ; since then \$1,000 has been appropriated by act of July 13, 1892. No further work has been done up to Dec. 31, 1892.

Wrecks.

During the last fiscal year the following wrecks were removed as obstructions to navigation : —

“Weybosset,” a schooner of 629 tons gross tonnage, sunk near bell buoy at Pollock Rip shoal ;

“Lucy Jones,” a schooner of 123 tons gross tonnage, sunk near Cross Rip light-ship in Nantucket Sound ;

“Allie Oakes,” a schooner of 127 tons gross tonnage, sunk near the breakwater at Hyannis ;

“Andrew J. York,” a schooner of 228 tons gross tonnage, sunk about seven miles north-west of Nantucket light ;

“Mary E. Oliver,” a schooner of 147 tons gross tonnage, sunk in Vineyard Haven harbor ;

“Python,” a schooner of 93 tons gross tonnage, sunk near bell buoy at Pollock Rip shoal ;

“Edith T. Gandy,” a schooner of 251 tons gross tonnage, sunk near Shovelful light-ship ;

“Florence Nowell,” a schooner of 222 tons gross tonnage, sunk near Pollock Rip light-ship ;

“J. B. Woodbury,” a schooner of 80 tons gross tonnage, sunk near life-saving station at Monomoy, south end of Cape Cod ;

“Bertha J. Fellows,” a schooner of 90 tons gross tonnage, sunk near life-saving station at Monomoy, south end of Cape Cod.

Since June 30, 1892, preparations have been made for the removal of the "Alva," a steam yacht of 1,151 tons, sunk near Pollock Rip light-ship.

Examinations have been made to prepare for the removal of the "Geo. S. Tarbell," a schooner (three-masted) of 525 tons gross tonnage, sunk about 4.8 miles south-west of Vineyard Sound light-ship; "Sooloo," a barge of 962 tons, sunk near bell buoy at Pollock Rip; "Storm King," a barge of 1,261 tons, sunk near bell buoy at Pollock Rip.

STATEMENT

OF

PROF. T. C. MENDENHALL.

[Referred to in the foregoing Report of the Board.]

UNITED STATES COAST AND GEODETIC SURVEY,
WASHINGTON, D. C., Jan. 7, 1893.

Mr. HENRY W. SWIFT, *Chairman Board of Harbor and Land Commissioners, 65 Bowdoin Street, Boston, Mass.*

DEAR SIR:—In reply to your letter of January 4, I will say that this office contemplates a complete shore-line and hydrographic resurvey of Boston harbor, from the head waters of the streams in the vicinity of Boston to the line from Nahant Head to Cohasset harbor. During the past summer four hydrographic and one topographic parties were engaged on this work, and it is hoped that the hydrographic portion will be completed this year. The topographic portion will take more time, as we are unable at present to detail more than one party, owing to pressing demands for their services in other localities.

Respectfully yours,

T. C. MENDENHALL, *Superintendent.*

APPENDIX.

APPENDIX.

[A.]

[See page 8 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS THIRTY-FIRST DAY OF DECEMBER, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-ONE, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND THE SAN FRANCISCO BRIDGE COMPANY, A CORPORATION ESTABLISHED UNDER THE LAWS OF THE STATE OF CALIFORNIA, PARTY OF THE SECOND PART.

The said party of the second part hereby covenants and agrees with the said party of the first part, to do and complete all the work and other things specified and described in the following specifications for dredging a section of the Reserved Channel and filling a portion of the South Boston Flats, in Boston harbor, all of the same to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth : —

Specifications.

Said party of the second part is to furnish all the plant, machinery, tools, appliances, materials and labor necessary for *dredging*, as hereinafter specified, that section of the Reserved Channel which lies west of a line drawn at right angles across said channel at a point 150 feet east of the easterly side line of L Street extended ; and also for *filling* to grade 13 all that area (not already filled to said grade) which is bounded southerly by the southerly side line of Cypher Street, westerly by D Street, northerly by Congress Street, and easterly by the sea-wall and the easterly side line of E Street.

Said section of the Reserved Channel to be dredged so that it shall have, upon the completion of all of the work under this agreement, a uniform depth of 12 feet at mean low water, and (including its present width of about 110 feet) a total width of 380 feet, with slopes of 2 to 1 on each side.

The dredging of that portion of said channel which is covered by and adjacent to the location of the proposed L Street bridge and its appurtenances, to be begun and completed in such season as not to hinder or delay in any manner the construction of said bridge by the city of Boston or its contractor; and, in doing all of the work under this agreement, care must be taken not to interfere with such construction, or in any way to injure said bridge, or any sea-walls, bulkheads or other structures on the South Boston Flats.

Said party of the second part also to provide a dumping and storage ground and elevating plant, to be located at such convenient place or places for the execution of the work as shall be approved by the Engineer, and to be of sufficient capacity to receive and dispose of all suitable material which shall be excavated under the pending contract with the United States for dredging at the Upper Middle Bar, and any other suitable material for which said ground may be assigned as a dumping ground by said Board of Harbor and Land Commissioners during the progress of the work. It is expected that the material from the Upper Middle Bar will exceed 200,000 cubic yards, that the delivery of it will begin as early as the season permits, and that all of it will be delivered before October 1, 1892.

Said party of the second part to receive all such material as delivered, and to keep the dumping ground in suitable condition for receiving the same at all times, and to keep the approach thereto free and easy of access for scows and tow-boats to bring material thereto within one hour and one-half before and after high water; and to make suitable regulations, to be approved by the Engineer, governing the dumping or delivery of such material; and said Board to provide for enforcing them in such way as it shall deem expedient.

All of the material dredged or received as aforesaid, to be elevated, conveyed, deposited and levelled on the above-described area south of Congress Street; *provided*, that any surplus of such material above that required for filling said area to grade 13, shall be elevated, conveyed and deposited on the area now partially filled and enclosed by a bulkhead on the north side of said Congress Street.

All material to be deposited at such place or places within said

areas respectively, and in such order, as may be prescribed by the Engineer, and as may be consistent with a convenient and practicable execution of the work.

Before depositing any material on the area north of Congress Street, the section or sections thereof prescribed for filling to be defined by the Engineer, and to be inclosed by said party of the second part by a bulkhead, or other barrier approved by the Engineer, sufficient to retain the filling.

The material deposited to be left smooth and level at grade 13, except in such places on the area north of Congress Street as are only partially filled at the completion of the contract, where the material may be allowed to take its natural slope.

The location, elevation, size, and manner of construction of the outlets and overflows for waste water, to be such as the Engineer approves.

No material to be allowed to escape or flow upon any lands or flats outside of retaining sea-walls or bulkheads, without first obtaining the consent of the owner thereof; and said party of the second part to erect such barriers as may be necessary to prevent the same.

Special care to be taken in depositing material in the rear of sea-walls and bulkheads so as not to disturb them, and the methods of so doing to be at all times such as meet the approval of the Engineer.

In all questions which may arise concerning measurements, lines, grades, and condition of dumping ground, the decision of the Engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by said party of the second part; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of the Engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of the Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

Upon the completion of the work, said party of the second part to remove all its plant and appliances, and to leave the premises in a condition satisfactory to the Engineer.

Estimates to be made by the Engineer of the amount of work done up to the end of each calendar month, and payment to be made thereon of 75 per centum of the contract price for all material deposited above grade 13, and 90 per centum for all below grade 13, the balance to be paid upon the final completion,

measurement and acceptance of the whole work; *provided, however*, that when an area of not less than 50,000 square feet has been levelled and maintained at grade 13 for two months to the satisfaction of the Engineer, and to the acceptance of said Board, it shall be measured and fully paid for, and said party of the second part relieved of further care of the same; but no area shall be so accepted and paid for until after the first day of October following the filling or levelling, if the filling or levelling was done over ice or with frozen material.

Measurements of material in the fill, made for the purpose of determining the amount of compensation due said party of the second part, to be based on the grade of the surface of the bottom before the work is begun, and the grade of the surface of the filling after the work is completed; and no allowance to be made for any settling, compression or displacement of the bottom, or for any shrinkage of the filling.

Preparations for the work to begin at once, and work to begin in ample season for the execution and completion of the several portions of the work within the times hereinbefore specified and described, and to be prosecuted vigorously and without intermission in all suitable weather. Said party of the second part to have upon the ground not later than March 31, 1892, a suitable and sufficient plant, machinery and appliances of its own for the execution of the work; and thereafter not less than 20,000 cubic yards of material to be deposited each month, excepting the months of January, February and March, and the whole work to be completed before the first day of July, 1893.

If said party of the second part refuses, neglects or fails to make satisfactory progress in preparing for the work and in procuring to be made a plant, machinery and appliances of its own for use in the work as aforesaid, or to begin, prosecute and complete, as aforesaid, any portion of the work to the satisfaction of said Board, or in any other respect to carry out the provisions of this agreement, said Board may in its discretion annul and terminate the same, and may contract anew with other parties, without prejudice to the claims of the party of the first part for damages arising from such refusal, neglect, failure, or other breach hereof.

All instructions, directions, notices or requests given or made to the agent, superintendent, or other person in immediate charge of its work, to be considered as duly given or made to said party of the second part.

The word "Engineer" as used herein means the Engineer of the Board of Harbor and Land Commissioners, or his authorized assistant in the supervision of the work.

The words "grade 13" mean the horizontal plane 13 feet above mean low water in Boston Harbor, as fixed and used by the Engineer in the work of improvement on the South Boston Flats.

And the said party of the first part, in consideration of the performance and completion of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of twenty (20) cents for each cubic yard of material measured in the fill, after the material has been dredged or received, elevated, deposited and levelled as hereinbefore described; the same to be in full compensation for all the work and other things done, furnished, performed and completed as aforesaid, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council; and the said San Francisco Bridge Company, by George W. Catt, its vice-president, thereunto duly authorized, has caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS,

By JOHN E. SANFORD, } Harbor and
JOHN I. BAKER, } Land
CHAS. H. HOWLAND, } Commissioners.

SAN FRANCISCO BRIDGE COMPANY,

By GEO. W. CATT, its *Vice-President*.

[SEAL OF
SAN FRANCISCO
BRIDGE COMPANY.]

J. M. TAYLOR, *Secretary*.

In Council, Feb. 3, 1892. Approved.

Witness the Seal of the Commonwealth.

[SEAL OF THE
COMMONWEALTH.]

WM. M. OLIN, *Secretary*.

[B.]

[See page 9 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS FIRST DAY OF JULY, IN THE YEAR EIGHTEEN HUNDRED AND NINETY-TWO, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND THE EASTERN DREDGING COMPANY, A CORPORATION ESTABLISHED UNDER THE LAWS OF THE STATE OF MAINE, AT PORTLAND IN SAID STATE, PARTY OF THE SECOND PART.

The said party of the second part, hereby covenants and agrees with the said party of the first part, to do and complete all the work specified and described in the following specifications for the filling of a portion of the South Boston Flats — all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth: —

Specifications.

The party of the second part is to furnish all the plant, tools, appliances, materials and labor necessary to fill to grade 13 a portion of the South Boston Flats with material to be dredged from around Mystic wharf in Boston harbor by said party of the second part under a contract with the Boston and Maine Railroad.

The area on which said filling is to be done is shown by the red shading on a plan on file in the office of the Board of Harbor and Land Commissioners entitled "Plan of the portion of South Boston Flats assigned for filling by the Eastern Dredging Co. June 1892. Scale $\frac{1}{2400}$."

The party of the second part to transport to and deposit on said area not less than 75,000 cubic yards and not more than 100,000 cubic yards of said material but with the consent in writing of the Board of Harbor and Land Commissioners may complete the filling of said area to grade 13.

All material to be deposited at such place or places within said area, and in such order, as may be prescribed by the Engineer, and as may be consistent with a convenient and practicable execution of the work.

No deposited material to be allowed to escape or flow upon any lands or flats outside of the said area, and the party of the second part to erect such barriers as may be necessary to prevent the same.

The material deposited to be left smooth and level at grade 13, except in such places on the said area as may be only partially filled at the completion of the contract.

Special care to be taken in depositing material in the rear of bulkheads so as not to disturb them, and the methods of so doing to be at all times such as meet the approval of the Engineer.

In all questions which may arise concerning measurements, lines, grades and condition of dumping ground, the decision of the Engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by the party of the second part; and convenient facilities for the inspection and measurement of the work to be furnished to the Engineer whenever requested.

All instructions and directions of the Engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of the Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

Upon the completion of the contract, the party of the second part to remove all its plant and appliances, and to leave the premises in a condition satisfactory to the Engineer.

No money shall be payable under this contract except from the Commonwealth's Flats Improvement Fund and after the first day of April 1893, but the Board of Harbor and Land Commissioners may in their discretion authorize in writing payments hereunder out of said fund before said date.

Estimates are to be made by the Engineer of the amount of work done up to the end of each calendar month, and after said April first 1893 or upon said written authorization by said Board payments are to be made of 90 per centum of the contract price, the balance to be paid upon the final completion, measurement and acceptance of the whole work.

For the purpose of determining the amount of compensation due the party of the second part the material to be measured by the Engineer in the scows in which it is brought to the work.

The work to be begun before the first day of September 1892 and the whole work to be completed before the first day of January 1894.

If the party of the second part refuses or neglects to prosecute the work as aforesaid, or in any other respect fails to carry out

the provisions of the contract, said Board may annul the same, and contract anew with other parties without prejudice to its claim for damages arising from the breach thereof.

The word "Engineer" as used herein means the Engineer of the Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

The words "party of the second part" mean the corporation contracting to do the work, or its agent in immediate charge of the work.

The words "grade 13" mean the horizontal plane 13 feet above mean low water in Boston Harbor, as fixed and used by the Engineer in the work of improvement on the South Boston Flats.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay the said party of the second part the sum of fourteen (14) cents for each cubic yard of material measured in scows as aforesaid, the same to be in full therefor, and to be paid at the times, and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said COMMONWEALTH OF MASSACHUSETTS, acting by its said Board of Harbor and Land Commissioners, hath caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and hath also caused these presents to be approved by its Governor and Council; and the said EASTERN DREDGING COMPANY, by George E. Runyan, its Treasurer, thereunto duly authorized, hath caused these presents to be signed and delivered in its name and behalf, and its corporate seal to be hereunto affixed.

THE COMMONWEALTH OF MASSACHUSETTS, .

By HENRY W. SWIFT, } *Harbor and*
JOHN I. BAKER, } *Land*
CHAS. H. HOWLAND, } *Commissioners.*

[SEAL OF THE
COMMONWEALTH.]

EASTERN DREDGING COMPANY,

[SEAL OF THE EASTERN
DREDGING CO.]

By GEORGE E. RUNYAN,
Treasurer.

In Council, July 21, 1892. Approved.

E. F. HAMLIN,
Executive Clerk.

[C.]

[See page 10 of this Report, *ante*.]

THIS SUPPLEMENTAL AGREEMENT, made this first day of January, A.D. 1893, by and between the Commonwealth of Massachusetts, acting by its Board of Harbor and Land Commissioners, and the Eastern Dredging Company, a corporation established under the laws of the State of Maine;

WITNESSETH: that whereas the parties hereto executed Articles of Agreement dated the first day of July, 1892, whereby the said Dredging Company agreed to do and complete all of the work specified in the specifications therein contained for the filling of a portion of the South Boston Flats; and

WHEREAS the said Dredging Company agreed to transport to and deposit on the area designated in said specifications not less than 75,000 cubic yards and not more than 100,000 cubic yards of the material therein named, but it was further provided that with the consent in writing of the Board of Harbor and Land Commissioners said Dredging Company might complete the filling of the said area to grade 13; and

WHEREAS said Dredging Company has now transported and deposited in accordance with the terms of said Articles of Agreement 100,000 cubic yards of said material;

NOW THEREFORE, it is agreed that the said Dredging Company shall complete the filling of said area as designated in said Articles of Agreement to grade 13, before the first day of January 1894 in accordance with the specifications in said Articles of Agreement contained, and shall be paid for the same at the same rate provided for in said Articles of Agreement, to wit: the sum of 14 cents for each cubic yard of material, measured in scows, as in said Articles of Agreement provided.

And it is further agreed that if the material named in said Articles of Agreement, to wit: material to be dredged from around Mystic wharf in Boston harbor by said Dredging Company under a contract with the Boston and Maine Railroad, is not

sufficient to complete such filling, the said Dredging Company shall, after using all of said material, complete the filling with other suitable material, which shall be accepted by the Engineer of the said Board of Harbor and Land Commissioners as satisfactory.

All the specifications and provisions of said Articles of Agreement of July 1, 1892 are to apply to this Supplemental Agreement and are hereby made a part hereof.

IN WITNESS WHEREOF, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, hath caused these presents to be signed and delivered in its name and behalf and the seal of the Commonwealth to be hereunto affixed, and hath also caused these presents to be approved by its Governor and Council; and the said Eastern Dredging Company hath caused these presents to be signed by George E. Runyan, its Treasurer, thereunto duly authorized, and to be delivered in its name and behalf, and its corporate seal to be hereunto affixed, all on the day and year first above written.

THE COMMONWEALTH OF MASSACHUSETTS,

By HENRY W. SWIFT, } *Harbor and*
JOHN I. BAKER, } *Land*
CHAS. H. HOWLAND, } *Commissioners.*

EASTERN DREDGING COMPANY,

[SEAL OF THE EASTERN
DREDGING CO.]

By GEORGE E. RUNYAN,
Treasurer.

In Council, January 18, 1893. Approved.

[SEAL OF THE
COMMONWEALTH.]

EDWARD F. HAMLIN,
Executive Clerk.

[D.]

[See page 10 of this Report, *ante*.]

ARTICLES OF AGREEMENT, MADE THIS TWELFTH DAY OF SEPTEMBER IN THE YEAR EIGHTEEN HUNDRED AND NINETY-TWO, BY AND BETWEEN THE COMMONWEALTH OF MASSACHUSETTS, ACTING BY ITS BOARD OF HARBOR AND LAND COMMISSIONERS, PARTY OF THE FIRST PART, AND WILLIAM A. KENRICK AND EDWIN M. KENRICK BOTH OF BOSTON IN SAID COMMONWEALTH, CO-PARTNERS DOING BUSINESS UNDER THE FIRM NAME OF W. A. KENRICK AND SON, PARTIES OF THE SECOND PART.

The said parties* of the second part hereby covenant and agree with the said party of the first part, to do and complete all the work specified and described in the following specifications for building about 300 feet of bulkhead on the South Boston Flats, all of said work to be done and completed in the manner, and in accordance with and subject to the terms and conditions, in said specifications set forth : —

Specifications.

Said parties of the second part are to furnish all the plant, tools, appliances, labor and materials necessary to build and complete about 300 lineal feet of bulkhead on South Boston Flats to close the two existing gaps in the present bulkhead.

The style and manner of construction of the bulkhead are shown on a plan on file in the office of the Board of Harbor and Land Commissioners, entitled, "Plan of Bulkhead to be built on South Boston Flats, August, 1892. Scale, 2 feet = 1 inch."

Said plan is made a part of these specifications, and is to be followed in all details shown thereon, though not specifically mentioned herein.

The bulkhead to be built of piles, driven six feet apart on centres, with two spurshores to each pile, one fitted at grade $3\frac{1}{2}$ and one at grade $11\frac{1}{2}$, and bolted to the piles with one $1\frac{1}{4}$ inch screw bolt in each spurshore. In addition, the heads of the upper

spurshores to be cut level, the sides cut square at the top, and a 6" \times 10' spruce stringer to be fitted on top of them notched down two inches and fitted into notches cut in the main piles, and bolted to the main piles by one 1½ inch screw bolt in each pile.

Three stringers of spruce timber, one 6" \times 8", and the other two each 6" \times 10", to be bolted on the face of the piles.

The planking to be of 3 inch spruce plank, placed vertically, driven to at least five feet below mean low water, and well spiked to the stringers with ¾ inch wrought iron ship spikes 7 inches long, and cut off level with the top of the highest stringer.

The planking to be still further secured by two battens of 3" \times 6" spruce, bolted through with ¾ inch screw bolts to the two upper stringers every six feet, with extra bolts at the joints.

The piles and spurshores to be of spruce, straight, sound and free from large knots, and not less than 10 inches in diameter at the butt when cut off, and not less than 6 inches in diameter at the point when ready for driving, — all measurements to be made under the bark, — and to be driven at least 12 feet into the hard clay; and all those injured in driving to be removed and replaced by perfect ones at the expense of the contractors.

The piles to be driven on a true line, so that the stringers may be put on full size without excessive cutting of the piles.

The piles to be cut off at grade 14, and the top stringer to be put on flush with the top of the piles, and the others as shown on plan, and bolted to the piles with 1" screw bolts.

The stringers to be in as long lengths as can be obtained, none less than 15 feet; joints to be spliced with pieces of the same not less than 3 feet long, and each splice fastened with four ¾ inch screw bolts, all as shown on plan.

The new work to be securely connected at the ends with the present bulkheads.

All planking and timber to be of spruce, sawed square, straight, sound, and free from large knots.

All iron work to be of best double refined wrought iron, satisfactory to the Engineer.

The statements herein made, as to the amount of work required, are believed to be correct; but the parties of the second part must examine for themselves, as no allowance will be made for any inaccuracies which may be found therein, or for any additional work or materials which may be found necessary in the due execution of the contract, or for any further loss or damage which may occur before the completion of the work.

In all questions which may arise concerning measurements, lines and grades, the decision of the Engineer to be final.

All necessary aid and materials for giving or indicating lines and grades to be furnished by the parties of the second part at their own expense; and convenient facilities for the inspection of the work to be furnished whenever requested.

All instructions and directions of the Engineer to be strictly observed and followed.

All of the work to be done to the satisfaction of the Engineer, and with such machinery and appliances, and by such methods, as shall be approved by him, and to the acceptance of said Board.

The work in the northerly gap to be commenced at once, and to be prosecuted vigorously in all suitable weather until completion; the work in the southerly gap to be commenced when directed by the Engineer but not later than Nov. 1, 1892, and to be completed as soon thereafter as practicable.

Upon the completion of the work, the parties of the second part to remove all of their plant and appliances, and to leave the premises in a condition satisfactory to the Engineer.

When the bulkhead closing the northerly gap is completed and accepted, the parties of the second part to be paid one-half the contract price for the whole work, the balance to be paid upon the completion and acceptance of the whole work.

If the parties of the second part refuse or neglect to prosecute the work, or in any other respect fail to carry out the provisions of the contract, said Board may annul the same, and contract anew with other parties, without prejudice to its claim for damages arising from breach thereof.

The word "Engineer" as used herein means the Engineer of said Board of Harbor and Land Commissioners, or his authorized assistant in immediate charge of the work.

The words "parties of the second part" mean the persons contracting to do the work, or their agent in immediate charge of the work.

The word "grade" means the grade above mean low water in Boston Harbor, as fixed and used by the Engineer in the work of improvement on the South Boston Flats.

And the said party of the first part, in consideration of the performance and completion of all of said work in the manner and in accordance with the terms and conditions aforesaid, hereby covenants and agrees to pay said parties of the second part the sum of fifteen hundred (1,500) dollars, the same to be in full compensation for all the work and other things done, furnished, performed and completed as aforesaid, and to be paid at the times,

and in the manner, and upon the terms and conditions, set forth in the foregoing specifications.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth of Massachusetts, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the seal of the Commonwealth to be hereunto affixed, and has also caused these presents to be approved by its Governor and Council; and the said William A. Kenrick and Edwin M. Kenrick have hereunto set their hands and seals.

THE COMMONWEALTH OF MASSACHUSETTS,

[SEAL OF THE
COMMONWEALTH.]

By HENRY W. SWIFT,
JOHN I. BAKER,
CHAS. H. HOWLAND, } *Harbor and
Land
Commissioners.*

W. A. KENRICK. [SEAL.]
EDWIN M. KENRICK. [SEAL.]

COMMONWEALTH OF MASSACHUSETTS.

In Council, Sept. 22, 1892. Approved.

EDWARD F. HAMLIN,
Executive Clerk.

[E.]

[See page 24 of this Report, *ante*.]

AGREEMENT made this second day of May, 1892, by and between the Commonwealth of Massachusetts and George W. Townsend of Boston, in said Commonwealth.

The said Townsend hereby agrees to remove the schooner "Lizzie Williams," now lying sunken and abandoned in the middle of the channel of Boston Harbor, off Bird Island Beacon, together with the masts, spars, rigging, sails, anchors, chains and all other parts and appurtenances of said vessel, to some point upon the South Boston Flats, as near high water mark as is practicable, which shall be accepted as satisfactory by Frank W. Hodgdon, assistant engineer of the Board of Harbor and Land Commissioners of said Commonwealth.

The said Townsend is to furnish at his own cost and expense, all the plant, apparatus, materials, appliances and labor necessary for said work, and to save the Commonwealth harmless from all liability for damages to any person or property caused by or in any way arising from the carrying out of this agreement.

The said work of removal shall be begun at once, and shall be prosecuted with due diligence until completion, and the same shall be completed within fourteen days from the date hereof. The said Townsend, however, agrees to remove said schooner from the channel of said harbor immediately, or as soon as the same can possibly be done.

Upon the performance of this agreement by the said Townsend to the satisfaction of the said Board of Harbor and Land Commissioners, said Commonwealth agrees to pay to said Townsend the sum of four hundred and forty (440) dollars, the same to be in full satisfaction for all things furnished and done under this agreement, and for all costs and expenses incurred by him in the performance of the same.

IN WITNESS WHEREOF, on the day and year above written, the said Commonwealth, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and

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delivered in his name and behalf, and the same to be approved by its Governor and Council ; and the said George W. Townsend has hereunto set his hand.

THE COMMONWEALTH OF MASSACHUSETTS,

By HENRY W. SWIFT, } *Harbor and*
JOHN I. BAKER, } *Land*
CHAS. H. HOWLAND, } *Commissioners.*

GEORGE W. TOWNSEND. [SEAL.]

In Council, May 4, 1892. Approved.

[SEAL OF THE
COMMONWEALTH.]

E. F. HAMLIN,
Executive Clerk.

[F.]

[See page 24 of this Report, *ante*.]

AN AGREEMENT, made this twelfth day of May, 1892, by and between the Commonwealth of Massachusetts and George W. Townsend of Boston, in said Commonwealth.

The said Townsend hereby agrees to patch all leaks in the hull of the schooner "Lizzie Williams," now lying sunken on the South Boston Flats, and float her by pumping the water from said hull, and then move her alongside the wharf or bulkhead on said flats, at a point to be designated by the Engineer of said Board.

All the leaks to be so patched that they shall be practically tight and satisfactory to said Engineer.

The said Townsend is to furnish at his own cost and expense, all the plant and apparatus, materials, appliances and labor necessary for said work, and to save the Commonwealth harmless from all liability for damages to any person or property caused or arising in any way in or from the execution of this contract.

The work to be commenced at once and completed as soon as possible.

Upon the completion of this contract as aforesaid, said Commonwealth agrees to pay said Townsend the sum of one hundred and seventy-five (175) dollars, the same to be in full compensation for all things furnished and done, and for all cost and expense incurred by him in the execution thereof.

IN WITNESS WHEREOF, on the day and year first above written, the said Commonwealth, acting by its said Board of Harbor and Land Commissioners, has caused these presents to be signed and delivered in its name and behalf, and the same to be approved by its Governor and Council; and the said George W. Townsend has hereunto set his hand.

HENRY W. SWIFT,	}	<i>Harbor and Land Commissioners.</i>
JOHN I. BAKER,		
CHAS. H. HOWLAND,		

GEORGE W. TOWNSEND.

[SEAL]

Approved in Council, May 18, 1892.

E. F. HAMLIN,
Executive Clerk.

[G.]

[See page 33 of this Report, *ante*.]

DECISION OF THE BOARD OF HARBOR AND LAND COMMISSIONERS
UPON THE APPLICATION OF JAMES L. LITTLE AND OTHERS,
EXECUTORS AND TRUSTEES UNDER THE WILL OF JAMES L.
LITTLE, DECEASED, FOR A LICENSE TO CONSTRUCT AN IRON
OR WIRE FENCE BETWEEN HIGH AND LOW WATER MARK AT
PHILLIPS POINT IN THE TOWN OF SWAMPSCOTT.

This case is one of great importance. The commissioners have given it very careful consideration, and since the hearings before the Board have personally visited Phillips Point and inspected the premises. The petitioners ask for a license to construct the fence in question for the express purpose of shutting out the public from the shore adjoining their land. It is admitted that their title extends to low water mark, subject to the rights of the public in and upon the shore under the common law of this Commonwealth as defined and limited by the Colony Ordinances of 1641, and 1647.

The petitioners claim that their property is rendered less desirable and impaired in value by the fact that the public resort to the rocks upon their shore for the purpose of fishing and recreation. They introduced evidence tending to show that some of the people resorting to the rocks behaved in an improper manner, and that their actions and conversation were such that the tenants of the houses upon the petitioners' land could not allow their children to go freely upon the rocks and shore, that the tenants have complained of this annoyance, and that some of them have given up their houses on this account.

The selectmen of the town of Swampscott appeared at the hearings both personally and by counsel, and stated that they neither opposed the petition or appeared in its behalf, and that they claimed in behalf of the town of Swampscott no right of way around the rocks on Phillips Point, except such rights as the

inhabitants might have under the common law to the use of the shores between high and low water mark.

Several citizens of Swampscott appeared to oppose the granting of the license on the ground that it would cut them off from the rights that they had always enjoyed of resorting to these rocks for fishing and recreation, and they testified that it had been the custom of the people of the town to use the rocks for these purposes since their earliest recollection. A petition to the same effect in opposition to the granting of the license was presented to the Board signed by one hundred and eighty-four inhabitants of the town of Swampscott. It appeared that the fish caught from the rocks were "nippers" or perch. It was also stated that the rocks from which the public would be shut off by the proposed fence are sometimes resorted to for the purpose of getting mussels for bait.

Some of the persons opposing the petition also claimed that the proposed fence would be an obstruction to navigation, but it did not appear that such obstruction would be of a serious character. It appeared that the rocks on which the petitioners ask to construct the fence cannot be approached except by a dory or small boat, and that in fact boats very rarely go to this particular point of the rocks, although they sometimes land on either side of it.

The petitioners claimed that, were it not for the statutes of the Commonwealth creating this Board and giving it jurisdiction over the shores of the Commonwealth and the granting of licenses for constructions thereon, they would have a clear right to build the fence in question, it being an occupation of the shore by them as proprietors of the adjoining upland by which they could lawfully deprive the public of the right of fishing and fowling over the portion of the shore thus occupied.

It may be admitted that this claim of the petitioners is correct. It seems impossible to distinguish this case from that of *Locke vs. Motley*, 2 Gray, 265, where the court held that the owner of certain land on Mystic River might lawfully drive stakes on the flats adjoining his land for the purpose of preventing the plaintiff from fishing on said flats. It was held that this was an occupation of the flats by which the owner of the land might lawfully curtail the rights of the public therein. That case was decided in 1854, before the creation of this Board, and before the passage of any of the statutes requiring such constructions to be licensed.

In the opinion of the Commissioners the action of the legislature in passing the acts relating to this Board and its powers, which are now incorporated in chapter 19 of the Public Statutes, was for the purpose of creating a body whose special duty should be to

guard the rights of the public in the tide-waters and upon the shores of the Commonwealth, and restrain riparian owners from encroaching upon the rights of the public, not only by preventing them from trespassing on the lands and waters of the Commonwealth, but also by restricting them to such use of their own land under tide-water as is not inconsistent with the public interest. Although the principal object of the statutes referred to was the protection of navigation, this was not their only object. Section 3 of chapter 19 of the Public Statutes provides that this Board "shall have charge of all the lands, flats, shores and rights in tide-waters belonging to the Commonwealth, except those for which other provision is made," and section 9 of the said chapter, under the provisions of which this license is applied for, does not restrict the Commissioners in the granting of such licenses to considerations affecting navigation only, although that is undoubtedly the principal purpose of the section. We consider that it is our duty in passing upon the granting of a license, to have due regard to the rights of the public in the shores of the Commonwealth appertaining to people on foot as well as to those in boats.

The counsel for the petitioners have been unable to produce a single precedent for the granting of a license in such a case as the present. This Board has hitherto, so far as known, never granted a license for a construction upon any of the shores of the Commonwealth for the avowed purpose of cutting off the common law rights of the inhabitants of the town in which the property was situated. If the petitioners in this case sought to obtain a license for a construction for a useful purpose, which it is for the interest of the community to encourage, such as the building of a wharf, the question presented would be a very different one, although such useful construction might incidentally cut off the public from the use of the portion of the shore thus occupied. But it is not pretended that the fence, which we are asked to license by the authority of this Board, is intended to be or can be used for any purpose except to prevent people from passing along the rocks from which the petitioners wish to exclude them. We do not think that any necessity or sufficient need of the construction of this fence has been shown, to justify us in granting this license for the purpose of cutting off the inhabitants of Swampscott from their enjoyment of their common law right to pass and repass over these rocks for the purposes of fowling and fishing. The fact, that some of the persons who have hitherto resorted there have behaved in an improper manner, does not seem to us to create such a necessity. The regulation of the conduct of these persons may very well be left to the authorities of the town of Swampscott. At any

rate this Board does not feel called upon to take part in such regulation, by shutting out the entire public from a portion of the shore where certain individuals are said to have misbehaved. One of the defects in the remedy sought by the petitioners is, that, instead of punishing only the persons who have offended, it would be excluding large numbers of well-behaved inhabitants of Swampscott from the enjoyment of rights in the shore which they greatly prize.

The order of the Board is that the granting of the license is refused.

MARCH 17, 1892.

HENRY W. SWIFT.

JOHN I. BAKER.

I concur in the above opinion, except so far as navigation is concerned. I believe this fence would be an interference with navigation sufficient to warrant the refusal of its license on that ground alone.

CHAS. H. HOWLAND.

[H.]

[See page 8 of this Report, *ante*.]

SECTIONS 3 AND 5 OF THE RIVER AND HARBOR ACT OF JULY 13, 1892, RELATING TO BRIDGES AND OTHER OBSTRUCTIONS IN NAVIGABLE WATERS, TO HARBOR LINES, ETC.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

SEC. 3. That section seven of the river and harbor act of September nineteenth, eighteen hundred and ninety, be amended and re-enacted so as to read as follows :—

“SEC. 7. That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, weir, breakwater, bulkhead, jetty or structure of any kind outside established harbor lines, or in any navigable waters of the United States where no harbor lines are or may be established, without the permission of the Secretary of War, in any port, roadstead, haven, harbor, navigable river, or other waters of the United States, in such manner as shall obstruct or impair navigation, commerce, or anchorage of said waters ; and it shall not be lawful hereafter to commence the construction of any bridge, bridge draw, bridge piers and abutments, causeway, or other works over or in any port, road, roadstead, haven, harbor, navigable river or navigable waters of the United States, under any act of the legislative assembly of any State, until the location and plan of such bridge or other works have been submitted to and approved by the Secretary of War, or to excavate or fill, or in any manner to alter or modify the course, location, condition or capacity of any port, roadstead, haven, harbor, harbor of refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless approved and authorized by the Secretary of War :

Provided : That this section shall not apply to any bridge, bridge draw, bridge piers and abutments the construction of which has been heretofore duly authorized by law, or be so construed as to authorize the construction of any bridge, draw bridge, bridge piers and abutments or other works under an act of the legislature

of any State, over or in any stream, port, roadstead, haven or harbor or other navigable water not wholly within the limits of such State.

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SEC. 5. That no money appropriated for the improvement of rivers and harbors in this act or hereafter, shall be expended for dredging inside of harbor lines duly established.

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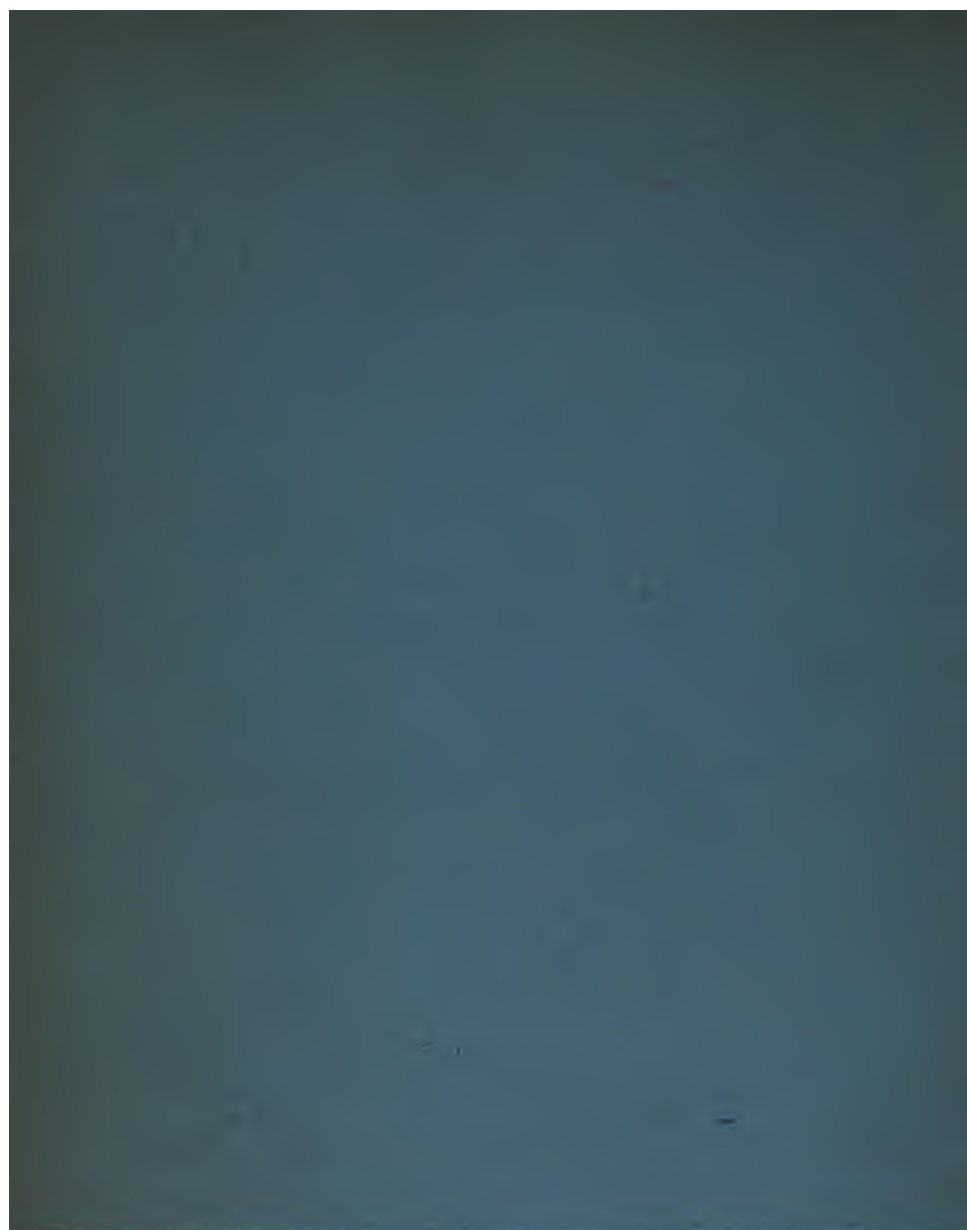
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